

APPENDIX B

**STATEMENT OF CURRENT CONDITIONS
2008**



December, 2008

**of the
Utah Lake Commission**



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Accronyms

| | |
|--------|---|
| AIS | Aquatic Invasive Species |
| BLM | U.S. Bureau of Land Management |
| CE-2 | Critical Environmental |
| cfs | cubic feet per second |
| CUP | Central Utah Project |
| CUWCD | Central Utah Water Conservancy District |
| EIS | Environmental Impact Statement |
| EPA | U.S. Environmental Protection Agency |
| ES | Environmental Statement |
| ESA | Endangered Species Act |
| FAA | Federal Aviation Administration |
| FDA | Food and Drug Administration |
| FFSL | Forestry, Fire & State Lands |
| FHWA | Federal Highway Administration |
| FPO | Floodplain Overlay Zone |
| FRA | Federal Railroad Administration |
| FTA | Federal Transit Authority |
| IBA | Important Bird Area |
| IWJV | Intermountain West Joint Venture |
| JSRIP | June Sucker Recovery Implementation Program |
| L RTP | long-range transportation plan |
| MAG | Mountainland Association of Governments |
| MASP | Metropolitan Airports System Plan |
| MBTA | Migratory Bird Treaty Act |
| MPO | Metropolitan Planning Organization |
| MVC | Mountain View Corridor |
| NAWMP | North American Waterfowl Management Plan |
| NEPA | National Environmental Policy Act |
| NPIAS | National Plan of Integrated Airport Systems |
| NVCS | North Valley Connectors Study |
| PCB | Polychlorinated biphenyls |
| PF | Public Facilities |
| RMU-W | Recreational Mixed Use West |
| SITLA | School and Institutional Trust Lands Administration |
| SLO | Sensitive Lands Ordinance |
| SUVMWA | South Utah Valley Municipal Water Association |
| TDS | total dissolved solids |
| TH | Transitional Holding |
| TMDL | Total Maximum Daily Loads |
| TP | total phosphorus |
| TSSD | Timpanogos Special Service District |
| UC | Utah Code |
| UDEQ | Utah Department of Environmental Quality |
| UDNR | Utah Department of Natural Resources |
| UDOT | Utah Department of Transportation |
| UDPR | Utah Division of Parks and Recreation |
| UDWR | Utah Division of Wildlife Resources |
| ULC | Utah Lake Commission |
| UPRR | Union Pacific Railroad |
| URMCC | Utah Reclamation Mitigation and Conservation Commission |
| USACE | United States Army Corps of Engineers |
| USBR | U.S. Bureau of Reclamation |
| USHD | Utah State Health Department |
| UTA | Utah Transit Authority |

I. INTRODUCTION

A. Study Purpose

The purpose of the Statement of Current Conditions section of the Utah Lake Master Plan is to provide a compendium of information on the lake and a ready reference for Utah Lake Commission decision makers. There exists a significant amount of information and data on Utah Lake resources and management issues. The goals of this document are to:

- Prepare a summary document from reports, data and maps that were provided by the Commission or identified by its member agencies about the existing conditions of the lake for use in the visioning process of the Master Plan.
- Provide the Commission with an easy-to-use and accessible source of relevant information on current trends and issues that will provide a valuable tool and complement the planning process.



The references for the supporting documents used in the preparation of this document are included in a reference section at the end of this document. The study area is shown on Map 1.1, Appendix A. All the maps that are referenced within this document are included in Appendix A. This report and supporting maps can be electronically accessed from the Utah Lake Commission website, www.utahlakecommission.org.

B. General Lake and Shoreline Description

Utah Lake encompasses more than 150 square miles (95,000 acres) and when at the normal full level contains over 870,000 acre-feet of water (Jackson and Stevens 1981). It is located in the Utah Valley at the eastern edge of the Basin and Range province, which extends from the Wasatch Range in the east to the Sierra Nevada range in the west. The lake is hypereutrophic, both in nutrient levels and biological productivity.

Utah Lake is a natural lake controlled as a reservoir, with water being released at the head of the Jordan River and rediverted at the Point of the Mountain and at other downstream diversions on the Jordan River. The water is primarily used for agriculture and mineral processing in Salt Lake County and is conveyed via the Welby-Jacob Canal. Occasionally, water is used in Utah County for irrigation purposes and is diverted via the Utah Lake Distributing Canal.

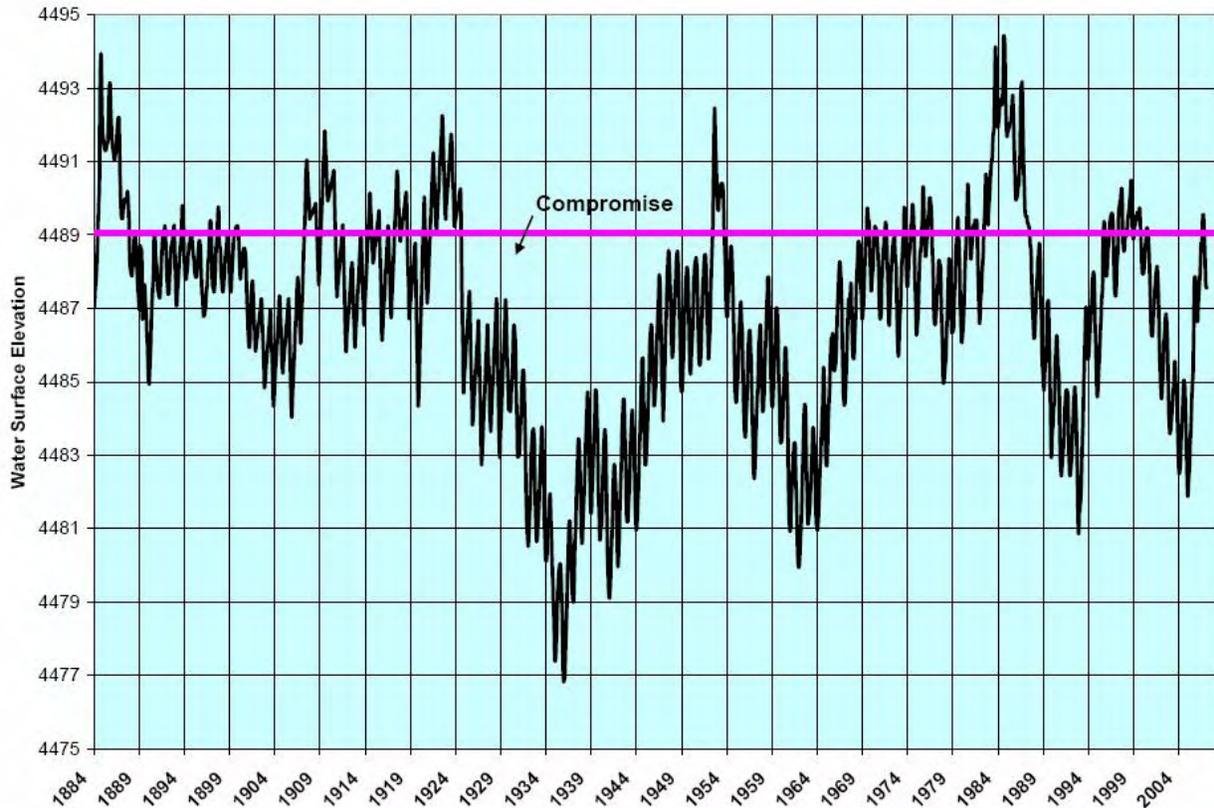
The northwest, Goshen Bay, and Provo Bay portions of the lake are shallower than the rest of the lake. During drought years these shallow parts of the lake bottom can be exposed. The bottom sediments are also different; the north end has more marlstone with little sediment, while the east and southern parts tend to have soft mud and loose sandy materials.

Factors affecting the lake level both seasonally and over long-term cycles include both natural climate occurrences and water development activities. These consist of precipitation within the Utah Lake Drainage Basin; use of the lake as a storage reservoir for irrigation and other purposes; evaporation; and upstream water use and imports (Thurin, 2007). Figure 1.1 shows the historic levels of the lake. Utah Lake is considered a semi-terminal lake because

approximately one-half of the water that enters the lake leaves via surface flow and the remainder is lost through evaporation (Fuhriman *et al* 1981).

Figure 1.1 — Historical Utah Lake Level — 1884-2006

Source: Utah Lake Water Level Fluctuation Study, Central Utah Water Conservancy District, 2007

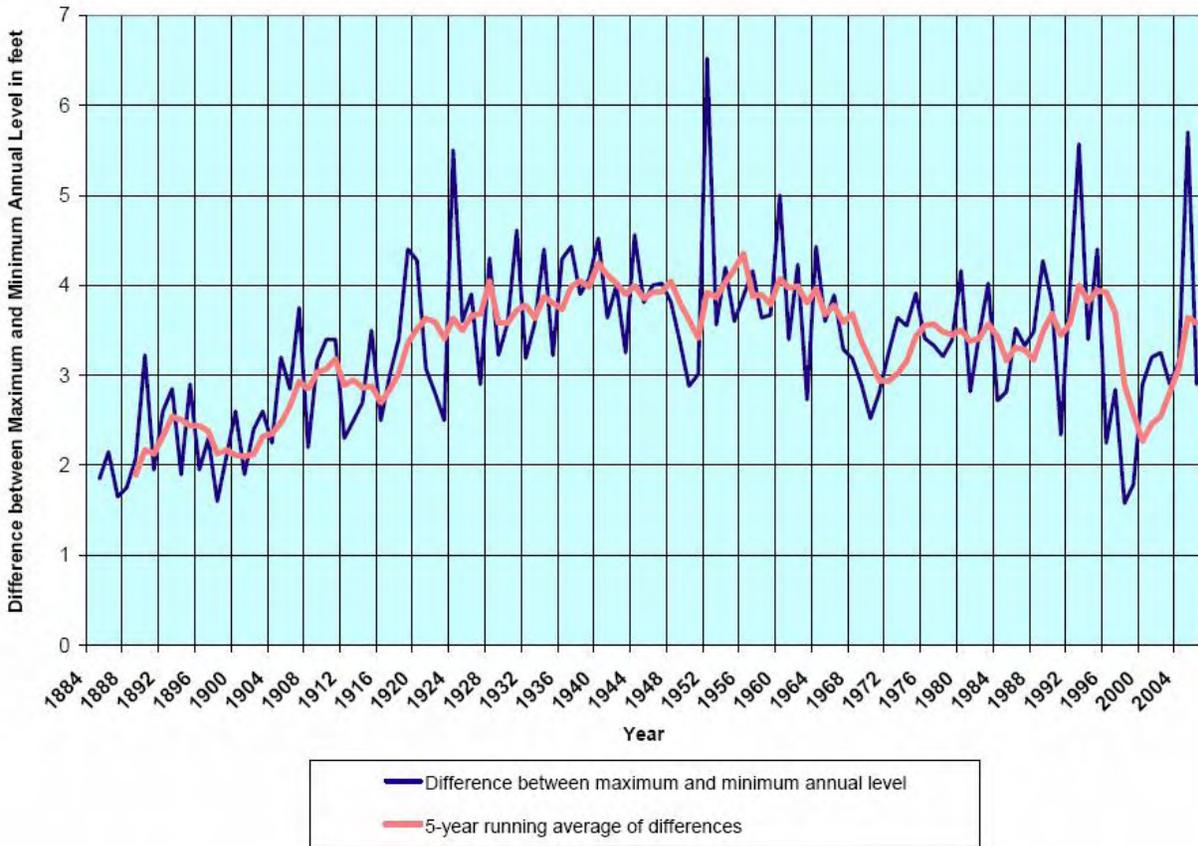


The lake is operated under an agreement between Utah Lake water users and land owners to mitigate flooding around the lake. The agreement was initially negotiated in 1885 and modified in 1985. Details of this agreement are described in Section II, Land Use and Shoreline Protection. When the lake reaches compromise elevation (4489.045 feet), the maximum lake depth is about 14 feet. Lake fluctuation varies during a year from 3.5 feet to 5 feet depending on weather conditions and irrigation deliveries. Figure 1.2 shows the annual and five year variation in the level of the lake. Only 160,000 acre-feet (at an elevation 8.7 feet below compromise) of the 870,000 acre-feet of the reservoir is inactive, not available for release (Division of Water Rights, 1993).



Figure 1.2 — Annual and Five Year Variation in Utah Lake Level — 1884-2006

Source: Utah Lake Water Level Fluctuation Study, Central Utah Water Conservancy District, 2007



It is important to note that although the elevation of the lake changes over time, the annual fluctuating elevation is based on complex relationships among inflow (surface and subsurface), outflow (Jordan River flows and evaporation), and water rights. The lake acts as a storage reservoir to satisfy water rights that are more than a century old.

In November of 1992, the Utah State Engineer began implementation of the *Utah Lake Interim Water Distribution Plan* which allows upstream reservoirs to store water, provided that storage does not interfere with the downstream water rights. It also clarifies quantities of water available to the Jordan River and enables replacement or exchange water to be provided in Utah Lake on condition of prior approval of the State Engineer. The distribution plan does not require water to be stored upstream, and thus has no direct impact on the level or water quality in Utah Lake. Thus, lake elevation fluctuates according to natural hydrology, demands for water within the existing water rights criteria, and lake evaporation.

C. Agency Regulatory and Management Responsibility

Fourteen federal and state agencies have regulatory and management responsibilities for Utah Lake. Utah County also has stewardship in unincorporated areas for trails, roads, fire protection and noxious weed control within the study area. Municipalities adjacent to Utah Lake also have jurisdiction and responsibilities within their cities. Table 1-1 lists state, federal, and other governmental agencies with Utah Lake-related responsibilities.

Table 1.1 – List of Federal and State Agencies with Utah Lake Responsibilities

| Agency | Responsibilities | Relevant Legal Authority |
|---|--|---|
| Federal Agencies | | |
| U.S. Fish & Wildlife Service | Protection of threatened and endangered species | Fish and Wildlife Coordination Act, Endangered Species Act, NEPA. |
| U.S. Bureau of Reclamation (USBR) | Management of withdrawn lands (reserved for USBR projects) adjacent to Utah Lake and USBR water rights associated with Utah Lake | Reclamation Act, 1902, NEPA |
| U.S. Bureau of Land Management | Management of BLM administered lands and Reclamation withdrawn lands adjacent to Utah Lake | Federal Land Policy and Management Act, 1976, NEPA |
| U.S. Army Corps of Engineers | Navigable waters and wetlands protection | Clean Water Act, NEPA, Harbors and Rivers Act |
| U.S. Environmental Protection Agency (EPA) | Protection of human health and the environment | NEPA, Clean Water Act |
| National Parks Service | Protection of archaeological and historical resources | Archaeological and Historical Preservation Act, NEPA |
| Utah Reclamation Mitigation & Conservation Commission | Management of Utah Lake Wetland Preserve and mitigation for Central Utah Project | Public Law 102-575, Titles II-VI, Central Utah Project Completion Act of 1992, NEPA |
| Utah State Agencies | | |
| <u>Department of Natural Resources</u> | | |
| Division of Forestry, Fire & State Lands | Planning, administration and management of State-owned lake bottom and shoreline | UC 65A, Article XX of the Utah Constitution |
| Division of Water Resources | Manages water resources of Utah Lake basin | UC 73-10-18 |
| Division of Water Rights | Administers water rights of Utah Lake basin | UC 73-2-1 |
| Division of Wildlife Resources | Manages and protects wildlife | UC 23-14-1 |
| Division of Parks & Recreation | Regulatory authority over populated waterways. Manages Utah Lake State Park, law enforcement, search & rescue operations, & navigational hazards | UC 63.11.17.1, UC 73-18 |

Table 1.1 (Cont.)

| Agency | Responsibilities | Relevant Legal Authority |
|---|--|---|
| <u>Department of Environmental Quality</u> | | |
| Division of Water Quality | Protect water quality of Utah Lake and tributaries | Utah Water Quality Act 19-5 |
| Division of Air Quality | Protect air quality of the state | Utah Air Conservation Act 19-2 |
| <u>Department of Community and Culture</u> | | |
| Division of State History | Preservation of historic and archaeological sites | National Historic Preservation Act, Sec. 106; Utah Annotated Code 9-8-404 |
| Other Governmental Agencies | | |
| Utah Lake Commission | Planning and coordination between agencies | Interlocal Agreement Creating ULC. HCR 1, 2007 |
| June Sucker Recovery Implementation Program | Recovery of the endangered species, June sucker | Cooperative partnership |
| Central Utah Water Conservancy District | Management of water resources and water rights under its jurisdiction in Utah Lake | Central Utah Project Completion Act, PL 102-575 |
| Utah County | Land uses adjacent to Utah Lake and enforcement of laws | |
| Municipalities | Land uses adjacent to Utah Lake and enforcement of laws and ordinances | Municipal statutes |

A summary of the management plans or guideline documents used by the State agencies is provided in Section VII.

II. LAND USE AND SHORELINE PROTECTION

A wide variety of activities take place on and near Utah Lake. Some activities include the development of land areas and occupation of structures. Others are more transient in character and include visitation and recreational activities.

For the purposes of the Utah Lake Master Plan, “Land Use” includes:

- a) Uses and activities on the water and sovereign lands (i.e., public trust lands) of Utah Lake, and
- b) Uses and activities above the sovereign lands boundary and within the study area on private and public lands that affect the lake and its resources.

The term “shoreline” is also susceptible to a variety of interpretations. For the purposes of the Master Plan, “shoreline” means the Utah Division of Forestry, Fire & State Lands (FFSL) Settlement Boundary. It is intended to include the area above the water level of the lake that includes beaches and bars, and is characterized by and subject to the effects of wind and wave action of the lake.

“Shoreline Management” includes all state, federal, and local plans and regulations that are implemented to preserve the ecological function of the shoreline of the lake, and the adjacent wetlands and uplands that form the near-lake ecological system. The study area of the Utah Lake Master Plan project extends beyond the shoreline of the lake and is shown on Map 1.1. This section of the Statement of Current Conditions summarizes current and near-term future land uses in the study area based on existing zoning of private lands and the current agency management direction of public lands.

The nature, location, and intensity of land uses on and adjacent to Utah Lake are determined based on the ownership (private or public) and agency management of the public lands involved. The bed of Utah Lake is sovereign land held in trust for the benefit of the public and is managed by the Division of Forestry, Fire & State Land. Sovereign lands include all lands below the agreed boundaries or those boundaries that have or may be adjudicated by the Courts (See Map 2.1). The sovereign lands boundary of Utah Lake has been difficult to determine. As a result, much of the lake boundary has been established by negotiation. However, portions of the sovereign land boundary had not been finalized as of 2008.

Above the sovereign lands boundary of Utah Lake, the use of private lands is subject to regulation by the cities located adjacent to the lake and by Utah County for private lands outside the cities’ boundaries. Uses and activities on federal lands within the study area are determined by the federal agency with jurisdiction over the land. In addition, the U.S. Army Corps of Engineers has jurisdiction over wetlands. The boundaries of the various city, state, and federal agencies are shown on Map 2.1.

A. Activities on Utah Lake and its Shoreline

Current and historical activities on the water at Utah Lake have been almost entirely recreational, and include boating, recreational and commercial fishing, hunting and water sports. Currently, there is one commercial fishing operation active on the lake. No oil and gas development or mining has occurred on the sovereign lands of Utah Lake.

Permitted activities along the shore of the lake within the sovereign land boundary include recreational, infrastructure facilities, grazing, environmental mitigation and access. A more detailed discussion of the recreational uses and access on and adjacent to Utah Lake is

contained in Section V, Recreation, of this report. The infrastructure uses in the study area are addressed in Section VI, Public Services and Capital Facilities, of this report.

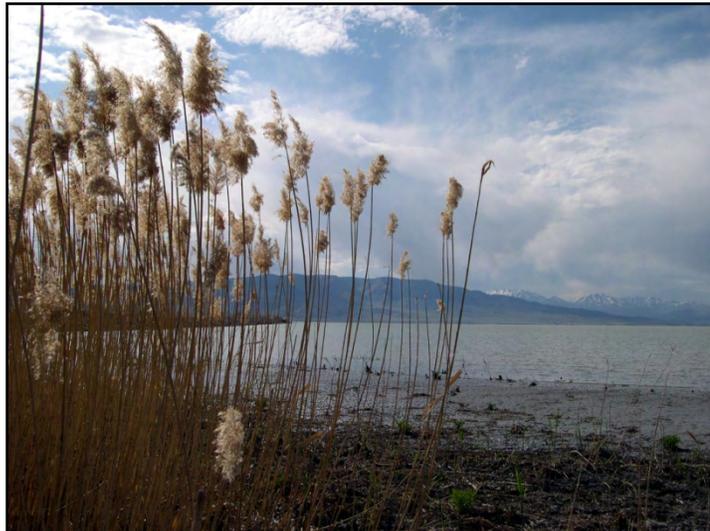
B. Cultural Resources and Historic Sites

The Utah Valley has a long history of human activity. Cultural resource studies have identified that humans inhabited the Utah Valley at least 6,000 years prior to the arrival of Europeans. This time of activity spans three periods: the Archaic period (hunter-gatherer culture, prior to approximately 700 AD); the Fremont period (cultivation supplementing hunting and gathering, from approximately 700 AD to 1350 AD); and the Late Prehistoric (approximately 1350 AD through the time of European occupation). Surveys conducted by an archaeology team from Brigham Young University summarized and documented the abundance of cultural sites along the shore of Utah Lake. (Janetski 1990, 2004)

Permanent European settlement started in earnest with the arrival of the Mormon pioneers in 1847. Map 2.3 shows 17 historic sites constructed prior to 1940 within the study area. Most of these sites are structures or homesteads and are located along the outside boundary of the study area. One site, the Provo Boat Harbor, developed in the 1920's, is located on the lake and is now part of the Utah Lake State Park. It was donated to the State Park system in 1967. Geneva Resort, at the location of the current-day Lindon Boat Marina, has also been designated by Lindon City as an historic site and is shown on Map 2.3.

C. Existing Patterns of Land Use

Existing land uses in the study area around Utah Lake vary from urban development; including residential, industrial and commercial uses; to large expanses of undeveloped shoreline. In general terms, the eastern and northern sides of the lake are the more developed areas, and the western and southern sides remain predominantly open lands. Most urban and suburban development is located within the incorporated cities that line the shoreline of Utah Lake, from Springville northward and westward to Saratoga Springs. Land uses within the cities include a municipal airport, agriculture, sewage treatment facilities, residential uses, parks, golf courses, marinas, and industrial uses.



The study area outside municipal boundaries is generally undeveloped and is primarily in agricultural crop production or grazing uses. The Utah County Land Use Map identifies almost all of the land outside city limits as currently in use for "Agricultural/Watershed" purposes. The majority of the land above the settlement boundary is in private ownership, and is therefore subject to the zoning and land-use regulations of Utah County and the cities around the lake. Several parcels of federal land about the lake on the south and west, which are currently managed for grazing and habitat-management purposes.

As Utah County cities grow, expansion is taking place toward the shoreline of Utah Lake, resulting in the conversion of agricultural lands for urban development purposes. Orem, for example, has adopted a Lakeview Area Plan for lands in the unincorporated County that lie to

the west of existing the City's boundaries and include the Utah Lake shoreline. It is expected that, as Utah County continues to grow, its cities and accompanying urban development, will move toward Utah Lake.

On the previously undeveloped western shore of Utah Lake, rapid urbanization is occurring. Saratoga Springs was incorporated in 1997, and has since grown into a city of approximately 12,000 residents. Within the study area, Saratoga Springs extends from the western boundary of Lehi to the west and south along the shoreline of Utah Lake. Approximately ten miles of lake shoreline is located within the city limits. Unlike the wetlands and floodplain areas that abut the lake shoreline on the eastern side of the lake, much of the land adjacent to Utah Lake in Saratoga Springs is rocky and dry, and the city has zoned much of this upland shoreline for residential development.

D. Land Use Plans and Regulations

Utah County and each of the cities within the study area have adopted general or comprehensive plans and accompanying zoning and subdivision regulations to implement their plans on private and city/county owned lands. The function of the general plan is to identify areas that are suitable and desirable for present and future land uses. The land-use elements of general plans have no regulatory effect. Development entitlements and land-use regulations are established in each jurisdiction's zoning and subdivision regulations.

Each jurisdiction is divided into zone districts—mapped areas in which identified uses are allowed. While current zoning of a parcel of land may differ from the current uses on the land, zoning authorizes future land uses consistent with the zone regulations, and signals future changes in land use to higher uses allowed in the zone. Although the names and specifics of each of the zoning districts differ among the jurisdictions that surround Utah Lake, there are similarities that allow the zone districts to be grouped into seven “composite zones” for the purposes of this Master Plan. The individual zone districts that make up the composite zones are shown in Table 2.1 and the locations of the seven composite zones are shown on Map 2.2. Following is a description of the composite zone categories:

- a) *Agricultural* – The Agricultural category includes agricultural and grazing land uses. These areas may or may not include typical city services such as water, sewage, roads or power. The minimum lot sizes vary from 0.5 acre to 50 acres in size. However, only parcels 5 acres or greater qualify for Greenbelt property tax status.
- b) *Industrial* – The Industrial category includes heavy to light industrial activities, business and industrial parks, manufacturing, processing, warehousing, fabricating and wholesaling land uses. Minimum lot sizes vary from zero to 25 acres.
- c) *Commercial* – The Commercial category includes neighborhood, community, and regional commercial land uses. Regional and community commercial areas are generally reserved for more intensive commercial uses such as regional/community shopping centers and employment centers. Neighborhood commercial areas serve local neighborhood needs. Minimum lot sizes range from 0.5 acre to 20 acres.
- d) *Open Space* – Undeveloped and lands preserved from development. This category could include parks. No lands in the study area are zoned for open space.
- e) *Sensitive Lands* – The Sensitive Lands category includes lands that have been specifically identified as having physical or environmental resources that require special consideration to develop. These areas include private, State, or federally owned lands, and environmentally sensitive areas such as hillsides, wetlands, and riparian areas.

Land uses may include parks, churches, public infrastructure, cemeteries and veterinary facilities. The only land with this designation is located at Lincoln Point.

- f) *Residential* – The Residential category includes areas for traditional detached and attached single family residential development. Land uses may also include duplexes, schools, and churches. There are no multi-unit designations within the study area. Typical minimum lot sizes range from 0.09 acres to 5 acres.
- g) *Public Facility* – The Public Facility category includes public and quasi public land uses such as parks and recreation facilities, schools, hospitals, airports, and utilities. Only two public utility zones are located in the study area—Provo Airport and wetlands east of I-15 in Springville.
- h) *Planned Unit Development* – The Planned Unit Development category includes areas for master planned development. These developments may include residential and non-residential land uses. The minimum project area is between 3 acres and 40 acres.

Table 2.1 – Existing Zones and Composite Zones

| Composite Zone | Utah County | Springville City | Provo | Genola | Orem | Vineyard | Lindon | American Fork | Lehi | Saratoga Springs |
|--------------------------|-------------|------------------------|--------------------------|--------|------|----------------------|--------|---------------------------------------|-----------|------------------|
| Agriculture | MG-1, A-40 | A1 | A120, A110, A11, A15, RA | A-1 | | A-1 | | RA-5, RA-1 | A-5, TH-5 | A |
| Industrial | I-1 | LIM, HIM, BP | PIC, M1, M2 | | CM | I-1 | L-I | BP-1, I-1 | | |
| Commercial | | HC, RC | SC3 | | | RC | CG, MC | | | RC, NC |
| Open Space | | | | | | OS | RMU-W | | | |
| Sensitive Lands | CE-2 | | | | | | SLO | SLO | | |
| Residential | TR-5, RA-5 | R1-15, RMHP, R2, RMF-2 | R110, R18, R16 | | R8 | R-1-8, R-1-15, RE-20 | | R1-20000, R1-12,000, R1-9000, R2-7500 | R-1-12 | R-3, R-6, R-10 |
| Public Facility | | | PF | | | | PF | | | |
| Planned Unit Development | | | SDP* | | PD | | | | PC | |

Note: Indicates Overlay. Contact local municipality for information on zoning classification descriptions.

Public Lands – Local, state, and federal agencies own and/or manage lands associated with Utah Lake, as shown on Map 2.1. Local government agencies own and manage land to meet various municipal objectives. State and federal agencies establish land use and management plans to meet their management mandates and the objectives. The main state and federal governmental agencies that manage lands within the study area include:

- a) U.S. Bureau of Land Management (BLM) – The BLM manages several parcels of land that abut Utah Lake. BLM manages public lands in accordance with adopted Resource Management Plans. The largest BLM parcel is a block of land that surrounds Goshen Bay at the extreme south end of the lake. These lands are managed primarily for habitat protection. Several other smaller BLM parcels are located 1) on the western shore of the

lake; 2) at the Benjamin Slough; and 3) adjacent to the Utah County Lincoln Beach parcel. BLM lands that lie within the Utah Lake Wetland Preserve boundaries are managed by the Utah Reclamation Mitigation and Conservation Commission (URMCC).

- b) The U.S. Bureau of Reclamation (USBR) owns a parcel of land at the extreme southwestern corner of the lake, on Goshen Bay. It is managed as part of the Goshen Bay Wetland Preserve.
- c) The Utah Reclamation Mitigation and Conservation Commission (URMCC) developed and will initially manage the Goshen Bay and Benjamin Slough units of the Utah Lake Wetlands Preserve. The preserve will subsequently be managed by the Utah Division of Wildlife Resources. This is discussed further in Section IV, Natural Resources.
- d) The State of Utah owns and manages the bed of Utah Lake for the benefit of the public. All uses of sovereign lands are subject to state statutes and rules that are implemented and executed by the Division of Forestry, Fire & State Lands (FFSL). The state also owns an upland mitigation site located at the north end of the lake which is restricted from development.
- e) The Utah Division of Parks & Recreation (UDPR) manages the Utah Lake State Park on the eastern shore of Utah Lake. It provides water-based and shoreline recreation, preserves Park resources, and functions as a recreation “link” for the communities near Utah Lake. The agency regulates the surface water uses of the lake. A more-complete discussion of the management of Utah Lake State Park is contained in Section V, Recreation.
- f) The Utah Division of Wildlife Resources (UDWR) manages several wildlife habitat areas and sportsmen access points within the project study area. The Powell Slough wildlife area, owned by the Bureau of Reclamation, is popular for waterfowl and pheasant hunting, and wildlife viewing. The Utah Lake Wetland Preserve (described in the wetlands description of Section IV, Natural Resources), is also managed by the UDWR. The UDWR has also acquired several sportsmen access points around the shore of Utah Lake.
- g) The State of Utah School and Institutional Trust Lands Administration (SITLA) manages several parcels within the study area. SITLA manages trust lands primarily to provide revenue for the financial support of Utah schools and identified state agencies. SITLA-managed lands in the study area are currently used for grazing purposes.
- h) There are also various school district lands associated with schools within the study area.



Special Designation Areas (non-governmental organizations) – Special status designations by non-governmental organizations exist for several areas in the Utah Lake study area. The National Audubon Society has identified areas on and near the lake as Important Bird Areas (IBA) which include Goshen Bay and Provo Bay. Provo Bay IBA is recognized for its importance to migrating waterfowl, and the Goshen Bay IBA is recognized for the number of shore and

wading birds that use that area. The National Audubon Society has no direct land-use regulatory power over lands that it does not own, but works with affected landowners and managers to achieve the habitat preservation purposes of the IBAs.

Utah Lake was identified as one of eight Utah focus areas in 1995 by the Intermountain West Joint Venture (IWJV, 2005). The IWJV is a public-private partnership, established in 1994, to identify, protect and restore key wetlands through implementation of the 1986 North American Waterfowl Management Plan (NAWMP). In 2002, Congress re-authorized \$75 million/year for the NAWMP. In 2001, the IWJV prepared a proposal and received a \$1 million grant for acquisition and protection of certain wetlands around Utah Lake. However, the infrastructure for utilizing and matching (50% match) the grant was not in place, so the funds were returned to the program. Future cooperative efforts for preserving wetland habitat might be eligible for similar funding.

Special Designation Areas (governmental agencies) – Special status designations by governmental agencies include

1. mitigation wetlands (wetlands constructed to mitigate wetlands losses at other sites) administered by the U.S. Army Corps of Engineers (USACE)
2. stream alterations of navigable waters of the United States (also administered by USACE) and
3. a special federal designation of a portion of Provo Bay resulting from the Central Utah Project Completion Act.
4. critical habitat for the June sucker on the lower Provo River

USACE has several mitigation wetlands within the Utah Lake study area. However, they do not maintain a current map or database of all the sites but they are administered individually. Two known proposed sites include a site north of the DCD transfer station. Another site, Hobble Creek Wetland area, is located on the east shore of Provo Bay (see Map 4.3 – Wetlands). These sites are mitigation wetlands for UDOT and UTA transportation projects respectively.

USACE also has jurisdiction over stream alterations. This requires permitting for any construction activities within Utah Lake, the Jordan River and all of the tributaries to Utah Lake. Some permitting review and approval responsibilities have been given to DEQ.

As part of Public Law 102-575, Sec. 306(d), Central Utah Project Completion Act, the U.S. government prohibited any Federal permits for commercial, industrial or residential development on a portion of the southern shore of the bay. It is described as starting at the mouth of the Spanish Fork River, extending east to the Provo City boundary and extending 2,000 feet into the lake from ordinary high water line.

The lower Provo River, from Utah Lake to a point 4.9 miles upstream, was designated on April 30, 1986 by the EPA as critical habitat for the June sucker, an endangered species¹. This reach of the Provo River is the primary spawning habitat and is consequently critical to recovery of the June sucker.

Resource Preservation Areas – Eight areas around Utah Lake have been identified as Resource Preservation Areas with the intention of managing them for different purposes including habitat for wildlife, restoration, conservation and preservation. These properties along with descriptions of why the areas were so designated and associated development restrictions

¹ <http://www.junesuckerrecovery.org/>

are described below. They have also been identified on the Management Classifications Map; Figure 2.4 on page 16 the Utah Lake Master Plan.

1. McLachlan Property (FFSL): This property found on the North shore of Utah Lake was obtained by the Utah Division of Forestry, Fire & State Lands as part of the boundary settlement proceedings for the purposes of creating a wildlife preserve.
2. Powell Slough: This federally owned property is a highly-valued wetland system that is to be managed for wildlife purposes, specifically the June sucker. There are development restrictions associated with this area.
3. Taylor Property: A Conservation Easement was recorded on the property on November 15, 2000 between the property owner Paul H. Taylor and The Nature Conservancy, a District of Columbia non-profit corporation. The primary purpose of the Easement is to preserve and protect in perpetuity and, in the event of their degradation or destruction, to enhance and restore the wetlands and relatively significant natural features and values of the property. It was also set aside to conserve important habitat for wildlife; to protect rare or unique native plants; and to conserve the wetlands communities and the wildlife inhabiting these communities.
4. Despain Property: This land was set aside to assure that it will be retained forever in its natural, scenic, agricultural, and/or open space condition and to prevent any use of the property that will impair or interfere with the conservation values of the property. A Conservation Easement was recorded on the property on December 31, 2001 and is called the K. Dale and Sonja Despain Cattle Ranch and Bird Refuge Conservation Easement. Permissible land uses include farming, ranching, management of wildlife habitat, and scientific research or education.
5. Provo City Wetland Mitigation Site: Provo City designated this property as wetland mitigation property for impacts to wetlands caused by its airport expansion. It was also established to provide habitat for birds and wildlife, and for preservation of natural and scenic beauty. The property is to be conserved and preserved in the condition it existed when the Easement was granted in May, 2000. The property cannot be developed in any way that would be detrimental to the preservation of the natural and scenic beauty and resources of the property.
6. Hobble Creek Restoration Project: The June Sucker Recovery Implementation Program (JSRIP) purchased property along lower Hobble Creek and has completed a project to restore a naturally functioning wetland and delta where Hobble Creek enters Utah Lake in order to provide an additional spawning habitat for June sucker. This area has been designated as a wetland mitigation site and is managed by the Utah Division of Wildlife Resources (UDWR). Much of the restoration work was funded by the Utah Transit Authority in fulfillment of a portion of their wetland mitigation required for their FrontRunner South project.
7. Benjamin Unit of the Utah Lake Wetlands Preserve: As part of the Central Utah Project Completion Act (CUPCA), Congress authorized a preserve to be established that included much of the area along and upland from Benjamin Slough. The Utah Reclamation Mitigation and Conservation Commission (URMCC) is authorized to purchase lands in the preserve as they become available. Once acquired, they are managed according to federal law that establishes wildlife refuge management requirements. The Utah Division of Wildlife Resources manages this preserve in accordance with those requirements. There are no restrictions placed on private lands that fall within the preservation areas.

8. Goshen Bay Unit of the Utah Lake Wetlands Preserve: As part of the Central Utah Project Completion Act (CUPCA), Congress authorized a preserve to be established that included much of the area along and upland from Goshen Bay. The Utah Reclamation Mitigation and Conservation Commission (URMCC) is authorized to purchase lands in the preserve as they become available. Once acquired, they are managed according to federal law that establishes wildlife refuge management requirements. The Utah Division of Wildlife Resources manages this preserve in accordance with those requirements. There are no restrictions placed on private lands that fall within the preservation areas.

E. Shoreline Management

As defined for the purposes of the Utah Lake Master Plan, shoreline management encompasses all jurisdictional regulations that are implemented to preserve the ecological function of the shoreline and near-shoreline areas of Utah Lake. Common objectives for effective shoreline management include the avoidance of natural hazards such as flooding; protection of valuable wildlife habitat; and protection of lake water quality through managing runoff and shoreline uses and activities.

Flood Hazards – Because of the shallow gradient of the shoreline of Utah Lake the hazard of flooding near the lake is significant. Map 2.4 shows the location of various flood zones within the Utah Lake study area. Five flood zones were identified for the lake. Zone A, the 100-year flood zone, is located on the north side of the lake, a large area on the southeast, and some small areas to the east. Zones B, C and X correspond to either areas outside of the 100-year flood zone with areas of 100-year sheet flow flooding of average depths of less than 1 foot; areas of 100-year stream flooding where the contributing drainage area is less than 1 square mile; or areas protected from the 100-year flooding by levees. Zone A4, an area inundated by 100 year flooding, for which no base flood elevation have been established, is located on the eastern side of Provo Bay. The most recent flooding event involving Utah Lake occurred over a three year period, peaking in June 1984. This event was the result of runoff from intense precipitation events beginning in September 1982. The runoff increased the lake level to a 101- year record of 5.46 feet above the compromise level. The flood resulted in damage estimates of \$5.9 million (U.S. Geological Survey, 2008).

During high water events, the operation of Utah Lake is governed by the 1985 Utah Lake Compromise Agreement. When Utah Lake is above compromise elevation (4489.045 ft.), the Control Gates at the Jordan River outlet are required to be fully opened. If flow in the Jordan River exceeds 3,400 cubic feet per second (cfs) at the 21st South gauging station, the Control Gates at Utah Lake are regulated to maintain that flow rate at that location.

The regulatory and policy tools available to communities and agencies around Utah Lake to accomplish shoreline management are varied, and can be generally described by the authorities of each agency by category.

Local Government – Local government land regulations include general or comprehensive plans, area plans, and zoning and subdivision regulations. Descriptions of the local government land use regulations that can be considered to be shoreline management measures that affect private property around Utah Lake include the following:

- a) *American Fork City* – The American Fork General Plan designates all of the Utah Lake shoreline and near-shoreline areas within its anticipated future boundaries abutting Utah Lake as Shoreline Protection areas in which parks, trails, golf courses and boat launch facilities are appropriate, but in which “...no habitable structures should be permitted....” The General Plan anticipates a transfer of any existing development rights in the

Shoreline Protection area to other locations in the city. The city has also adopted a Sensitive Lands Ordinance (SLO, Ordinance 07-10-47) to restrict land uses to those that do not present unreasonable hazards and to protect and preserve natural features. The SLO requires a developer to evaluate designated sensitive lands and design development so as to avoid hazards and environmentally sensitive areas. The regulations of the SLO apply to mapped hazardous areas and “Such other lands...as may be designated by the Planning Commission.”

- b) *Genola Town* – The Genola General Plan designates the land within the study area as Agricultural. The zoning for the property is Agricultural (A-1). The A-1 is intended to provide areas where agricultural and residential uses and open spaces can be encouraged and maintained. The permitted uses include single family homes and agriculture.
- c) *Lehi City* – Lehi’s General Plan identifies the shoreline of Utah Lake within the City as an Environmentally Sensitive Area to avoid flooding hazards and protect lands with ecological constraints on development. In this area, development is “highly discouraged, and generally not appropriate.” Any development that is approved must be carefully planned to avoid hazards and minimize environmental impacts. The current City zoning designation for the shoreline and near-shoreline areas is Transitional Holding (TH), which is a zone that contemplates future re-zoning and development, but does not specifically establish protective land-use standards. Given that the area is within an Environmentally Sensitive Area, it is assumed that future development proposals will be expected to provide for hazard avoidance and ecological protections.
- d) *Lindon City* – The City of Lindon General Plan designates the land within the study area as Mixed Commercial, Commercial, Light Industrial, Public Facilities and Open Space. The designated zoning districts that include the shoreline of Utah Lake are Public Facilities (PF) and Recreational Mixed Use West (RMU-W). Lindon has adopted a Sensitive Area District ordinance that identifies District #2 as all areas in the City below the elevation of 4,650 feet, which includes the lake shoreline. Developments within designated sensitive areas are reviewed for “unsafe physical conditions” including shallow groundwater, and development in wetlands is prohibited. Floodplain areas are regulated to protect property damage during flood events.
- e) *Orem City* – Orem City has 1.88 miles of shoreline on Powell Slough but none directly on Utah Lake. Although Orem City boundaries do not currently include Utah Lake shoreline, the City has adopted the Lakeview Area Plan for unincorporated areas within the declaration of annexation area that do include shoreline areas in anticipation of future annexation applications. The Plan contemplates that the OS-5 zone district would be applied in the shoreline and near-shoreline areas if annexed into the City. The OS-5 zone district provides for residential development at a density of one unit per five acres, with clustering of development to provide for significant open space within the



development. The Lakeview Area Plan proposes that open space near the lake be managed to preserve views and wildlife habitat, and provide for passive recreation.

- f) *Provo City* – The Provo General Plan identifies Provo Bay and the area to the north of Utah Lake State Park as Developmentally Sensitive areas, “...to denote the need for additional studies to determine if lands can or should support new development or redevelopment.” Those areas are currently zoned Agricultural or for public facilities. While no specific land-use regulations have been adopted for areas designated Developmentally Sensitive, the general plan contemplates future re-



zoning requests in agricultural areas to allow for development, at which time special conditions to avoid hazards and protect environmentally sensitive features should be applied as conditions to the development approvals.

- g) *Saratoga Springs* – The Saratoga Springs General Plan land-use map designates several areas of the shoreline of Utah Lake as Natural Open Space. The Natural Open Space designation identifies areas within the City that are to be reserved as undeveloped open space or developed for passive recreation activities. The lands so designated are currently zoned Agricultural. The General Plan anticipates future re-zoning applications for agricultural areas, and anticipates that open space and sensitive areas along the lakeshore will be established and protected as a function of project review and approval.
- h) *Springville* – The Springville General Plan designates the land within the study area as Agricultural, Low Density Residential, Medium Low Density Residential, Medium Density Residential, Medium High Density Residential, Mixed Use, Commercial and Industrial Manufacturing. There are a variety of residential and non-residential zoning districts that are used to implement the General Plan. Currently Springville does not have any shoreline or near-shoreline area preservation designations or shoreline management regulations. However, development is regulated within the floodplain.
- i) *Town of Vineyard* – The Vineyard General Plan designates the lakeshore within the town boundaries as the Shoreline Preservation area. The general plan land use designations within the study area include: Planned Community, Residential, Open Space, Public Facility and Commercial. The current zone classifications adjacent to the lake include Agriculture, Residential and Industrial. It is anticipated that the planned unit developments in the vicinity of the lake will be designed to implement the Shoreline Preservation designation as a part of the project review and approval process.
- j) *Utah County* – The Utah County General Plan designates the land within the study area as Agriculture. In addition, protection of water quality and environmental values are identified as objectives in the Environmental Element of the Plan, along with avoidance of natural hazards. The Floodplain Overlay Zone (FPO) and the Critical Environmental (CE-2) districts provide shoreline management regulations. The FPO regulates development within the floodplain. The CE-2 zone provides for low density residential (one unit per 20 acres), campgrounds, parks, governmental facilities (one per five acres), and agricultural operations. Special restrictions on grading and the use of septic

tank systems also apply in the CE-2 zone. Areas zoned Utah County CE-2 are shown on Map 2.2.

- k) *State Government* – FFSL manages the sovereign lands of Utah Lake pursuant to Utah State Code Title 65A and associated division rules under multiple-use sustained yield principles consistent with the Public Trust Doctrine. Management associated with public and resource benefit is consistent with long-term sustainability and productivity of the land and resources. While FFSL does not have jurisdiction over private uplands, shoreline protection is a primary concern and prudent management of sovereign land resources guides leasing and permitting decisions.

The State of Utah SITLA also owns and manages properties within the study area, primarily near the southern shore of the lake. SITLA's management objectives are primarily to provide support to Utah public schools and several other State trust institutions. SITLA is not bound by the Public Trust Doctrine in making its management decisions as it seeks to increase revenue.

Federal Government – In general, each federal agency has distinct mandates and management objectives. BLM manages public lands for multiple uses and sustained yield of resources. Management of BLM lands around Utah Lake is the responsibility of the BLM Salt Lake Field Office pursuant to adopted resource management plans. Resource management plans seek to balance the broad array of permissible uses of public lands in a manner similar to the zoning approach utilized by local governments. The large BLM block of land that surrounds Goshen Bay is being managed to preserve healthy wildlife habitat, and is focused on shoreline protection. The smaller parcels of BLM-managed land on the western shore of the lake are managed for grazing, and are therefore not included in the shoreline protection category of regulations that apply on Utah Lake.

Extent of Utah Lake Shoreline Management – As defined above, "Shoreline Management" means any regulation or land-use management tool that is designed to preserve the ecological function of the Utah Lake shoreline and its associated near-shoreline areas. The management objectives address a broad array of topics, including flood hazard avoidance, protection of water quality, preservation of wildlife habitat, and protection of significant views, among others

Many communities combine regulations to avoid natural hazards with those to protect ecological function under the general heading "sensitive lands" ordinances. Frequently an area that poses natural hazards (a floodplain, for example) also possesses environmental values such as riparian vegetation and wildlife habitat. The objectives of hazard avoidance and environmental protection can often be met by a single regulation. The nomenclature of each community's regulatory approach to mitigating hazards and protecting environmental values is different. As well, the approach to achieving the management objectives is different.

As discussed above, the general plans of each of the communities with Utah Lake shoreline within their jurisdictional areas have either identified the shoreline specifically, or environmentally sensitive and hazardous areas more generally, as deserving of special management and regulation. American Fork and Orem have also identified the Utah Lake shoreline by name as deserving special consideration, even though their city boundaries do not yet include shoreline areas.

Likewise, each of the jurisdictions has adopted land-use regulations that address development in potentially hazardous and environmentally sensitive areas such as the Utah Lake shoreline and the adjacent near-shoreline areas within the study area. American Fork and Utah County have designated specifically-mapped areas within their jurisdictions where the special ordinance provisions apply. American Fork's ordinance creates an overlay zone, a set of special standards that apply in designated areas in addition to the regulations of the underlying zone. Utah County

has established a specific zone that addresses all the development requirements in the identified zoned areas.

Other communities rely more on appropriately conditioning development approvals to meet the requirements of their sensitive area and hazard avoidance regulations. This approach works for communities that have established “holding zones” for lands that are not yet developed, but will likely be developed in the future. Lehi, for example, has established a TH zone in which current, primarily agricultural, uses are permitted. Residential or commercial development, however, will require a re-zoning of the land, which creates the opportunity to review and condition development applications so as to achieve General Plan objectives for the area, including hazard avoidance and environmental protection.

Provo, Orem, Lindon, Saratoga Springs, Springville, Genola, and Vineyard have current zoning designations for the Utah Lake shoreline that allow agricultural and other low-density uses. For residential or commercial development to take place near the lake, the land will need to be re-zoned, and those cities will apply their sensitive areas criteria and standards at the time development approvals are sought.

In summary, all the cities that include or are adjacent to the Utah Lake shoreline within the study area have adopted general plans that identify the shoreline as deserving of special consideration and protection to avoid hazards and minimize impacts on sensitive areas. All have likewise adopted land-use regulations to manage development on the shoreline and in near-shoreline areas.

Most of the shoreline of Utah Lake is in the unincorporated area of Utah County and, except for the areas zoned CE-2, is not subject to specific shoreline management regulations. However, the Land-use Element of the County's General Plan encourages residential and commercial uses to locate either within or adjacent to an existing city, or be designed as a stand-alone, full-service community. It seems unlikely that the County will act favorably on re-zoning and development applications in the Utah Lake study area that are inconsistent with its General Plan, or adversely affect the Utah Lake shoreline.



During the creation of this document, many of the participants contacted indicated that a more coordinated approach to management of the Utah Lake shoreline and near-shoreline areas within the study area would be beneficial, both in terms of providing more consistency in regulations from community to community, and in providing for more effective shoreline management. The Utah Lake Commission was formed to promote beneficial utilization of the natural resources of the lake. While the Commission has no regulatory authority for land use, it can facilitate this coordination.

F. Geologic Hazards

Geologic hazards within and surrounding Utah Lake are limited to seismic hazards associated with faults located within the lake and with liquefaction of soils. There are no known potential landslides adjacent to the lake and susceptibility to landslides around Utah Lake is low (Utah

Geological Survey, Map 228DM, Landslide Susceptibility Map of Utah). Liquefaction (liquefying of soils during a seismic event) potential is high in all areas around the lake, with the exception that West Mountain is low potential (Utah Geological Survey, 1994).

G. Current Uses Map

Map 2.5 represents current use designations of lands around Utah Lake. For the most part, the current uses are the same as the Composite Zones shown on Map 2.2.

H. Issues and Trends

Land uses around Utah Lake within the study area have remained relatively the same for many decades with the following exceptions:

1. Urbanization of the west side of the lake (with golf course).
2. Some urbanization in Lehi near the lake.
3. The decommissioning of Geneva Steel.
4. Creation of wildlife preserve areas in the south end of the lake.
5. Creation of a golf course (Sleepy Ridge) in Orem near Utah Lake.

As population increases, increased urbanization within the Study Area is expected. Some communities have anticipated this growth pressure and have enacted ordinances to protect Utah Lake and/or to establish buffers between development and the lake.

Changes in land use from agricultural to residential and commercial require the installation of streets, water, sewer and other public infrastructure. Development around Utah Lake is anticipated to occur sooner in areas with existing water and sewer facilities, such as the areas between Provo and Saratoga Springs, than in other areas around the lake. Development on the West side of Utah Lake is not likely in the foreseeable future because of the lack of potable water and wastewater treatment.

In a rapidly growing area like Utah County, many factors contribute to determining the location of likely future development of agricultural land. Land costs are lower in undeveloped areas away from the main population centers, but the cost of required infrastructure is higher. Existing zoning that allows residential and commercial development and the provision of public infrastructure encourages development in those areas.

It is helpful for the Utah Lake Commission to be able to identify areas within the study area that are likely to develop in the near future in order to secure public access and provide for protection of sensitive areas, while supporting the kinds of development that help achieve the Commission's objectives. While it is difficult to predict with any accuracy the next areas of urban-type development around Utah Lake, there are several key indicators that development is on the horizon. Those include applications to re-zone property from agricultural to development uses; the installation of public infrastructure such as roads, sewer, and water; the acquisition of large parcels of land by developers; and announcements of future development plans.

The Commission can track the activities of its member entities and other public service providers; and monitor the news media for indications that new development is planned around Utah Lake. The Commission can then follow-up on that information to encourage proposed development that complements the Commission's goals and objectives.

III. TRANSPORTATION

The two primary transportation modes affecting Utah Lake are air and ground. The Provo Airport is considered a vital part of private transportation for the area and is discussed later in this section. The primary needs for ground transportation around Utah Lake are minimizing congestion on roads between residential areas west of the lake and businesses and commercial areas located east of the lake and north into Salt Lake Valley. Map 3.1 shows the location of existing access roads within the study area. Due to the unique geographical constraints along the Wasatch Front, transportation needs are further magnified and complicated beyond what a typically rapid-growth area would encounter. Currently, I-15 is the only major North-South corridor that serves to transport the high traffic volumes of the majority of commuters to Salt Lake Valley on the eastern side of the lake, while SR-68 serves as the only north-south route to the west. The major East-West routes that currently exist are SR-73 (Lehi Main Street) to the north and US-6 along the south. Most of these routes operate far above their designed capacity, resulting in increased congestion and reduced level of service.

The major connections between the east and west are much further from the lake itself and due to the limited number of connectors, several concepts by many agencies at all levels have been suggested as possible means to improve existing conditions and provide greater mobility around the lake. Several of the concepts have potentially significant impacts on Utah Lake and its immediate surroundings.

In addition, other modes of transportation besides highways are being developed and studied. The other modes of transportation include transit improvements and trails systems. In an effort to identify and clarify both the transportation needs as well as the various agencies' solutions, the numerous studies of proposed transportation corridors that have either recently been completed or are in process are presented clearly and concisely and will be discussed in further detail below.

Long-term transportation planning of major regional roads in Utah County, including those currently planned within the Utah Lake study area, as well as future routes, is a function of Mountainland Association of Governments (MAG). Mountainland Metropolitan Planning Organization (MPO), which is a part of MAG, is the planning organization over urban Utah County. The MPO has representation from all of the municipalities of Utah County. It is charged with coordinating regional planning activities with local municipalities, Utah County, and the Utah Department of Transportation (UDOT). It also serves as a conduit for federal funding and coordination of federal oversight of projects that receive federal funds. Federal agencies that might have oversight responsibilities include the Federal Highway Administration (FHWA), Federal Transit Administration (FTA), Federal Railroad Administration (FRA), and the Federal Aviation Administration (FAA). Planning of smaller collector-type roads and minor arterials that are not regionally significant are generally planned by local and county government.

For simplicity, the MAG proposed long-range transportation plan (LRTP) will be used as a reference from which all other plans will be compared. The MAG LRTP is provided as a primary reference because it provides a much more general and broader overview of all aspects affecting Utah Lake than any local or state agency transportation plans. For reference, the general maps created by MAG are provided in Appendix A as Maps 3.2, 3.3, and 3.4. As changes occur to lands adjacent to Utah Lake, MAG will update the plans.

A. Local Access Roads

The majority of the accesses to Utah Lake are directly to the marinas or open shoreline areas. Among these marinas are the Utah Lake State Park access from the east, the Lindon and

American Fork Marinas from the northeast, Lincoln Beach from the south and the three Saratoga Springs accesses from the west. The other direct accesses to the lake as well as major roads adjacent to the lake itself are shown below in Table 3.1.

Table 3.1 – List of Utah Lake Access Roads

| Road/Access | Description | Jurisdiction |
|---------------------------------|---|------------------|
| Redwood Rd. (SR-68) | Major Arterial adjacent to Utah Lake | State |
| Access Rd. (SR-68 MP 19) | Unpaved access on west side of lake | County |
| 2000 North | Unpaved access on west side of lake | County |
| Centennial Blvd. | Minor Collector adjacent to Utah Lake | Saratoga Springs |
| Cascade Dr. | Direct Access | Saratoga Springs |
| Saratoga Rd. | Major Collector adjacent to Utah Lake | Saratoga Springs |
| Parkway Blvd. | Minor Collector adjacent to Utah Lake | Saratoga Springs |
| 1900 So. Lehi (7350 No. County) | Minor collector adjacent to Utah Lake | Saratoga/Lehi |
| Lakeview Dr. | Minor Collector adjacent to Utah Lake | Saratoga Springs |
| 500 West (8350 West) | Minor Collector / Direct Access | Lehi |
| 6000 West | Direct Access to AF Boat Harbor | County |
| 600 South | Direct Access to Lindon Marina | Lindon |
| Geneva Rd. | Major Collector adjacent to Utah Lake | Vineyard |
| Vineyard Rd. | Minor Collector adjacent to Utah Lake | Vineyard |
| Business Park Dr. | Minor Arterial / Direct Access to Powell Slough | Orem |
| North Boat Harbor Dr. | Minor Arterial to Utah Lake State Park | County |
| Center St. | Minor Arterial to Utah Lake State Park | Provo |
| Provo Airport Dike Road | Direct Access to Utah Lake | Provo |
| Spanish Fork River Rd. | Minor Collector adjacent to Utah Lake | County |
| Lincoln Beach Rd. | Minor Collector adjacent to Utah Lake | County |
| Goshen Bay Rd. | Direct Access | County |
| SR-77 | Major Arterial adjacent to Utah Lake | State |
| 4000 West (SR 77) | Direct Access to Utah Lake | County/State |

In addition to Table 3.1, Map 3.1 displays the locations of all the roads listed. There are no major arterials connecting the east and west sides of the lake.

B. Transportation Studies

Currently there are 13 known Metropolitan Planning Organization (MPO) studies or Environmental Impact Statements (EIS) that are either completed or are in process that stand to directly affect the transportation corridors adjacent to Utah Lake. These are briefly summarized on Table 3.2. These studies were conducted to address issues related to increased growth and traffic congestion (access and mobility) within study areas and adjacent connectors.

C. Planning for East - West Corridors

Several of the studies previously listed contain detailed information on the proposed alternatives to alleviate already overburdened east-west corridors. Most of the proposed corridors have come as a result of the North Valley Connectors Study (NVCS) as well as the Mountain View Corridor (MVC) EIS, which was recently completed. The 2100 North alternative was chosen as the connection between MVC and I-15. MVC will terminate at SR-73.

The original East-West connector (1000 South, Lehi) between SR-68 and I-15 is currently under construction and will be called Pioneer Crossing. Both Lehi and Saratoga Springs also plan for another East-West Corridor to the south along the shore of Utah Lake that follows the 1900 South alignment originally identified in the NVCS. The corridor would consist of two sections: the first reach would connect the existing Pony Express Parkway in Eagle Mountain with SR-68 along Center Street in Saratoga Springs, while the second would connect SR-68 to I-15 at the Pleasant Grove, Lindon area along what is now 1900 South (Lehi) or Center Street (Saratoga Springs), as the road transitions between both Saratoga Springs and Lehi street classification systems.

One additional major east-west corridor requiring an environmental and feasibility study is the Utah Lake crossing (West Lake Highway). This proposed corridor would serve to directly connect the developing eastern urban areas to the west side of Utah Lake by placing a crossing over Utah Lake. This project is deemed as a “vision” project by MAG because it is not included in the 2030 LRTP, nor is it currently funded. Funding for a study to be conducted by UDOT and initially called the Utah Valley Connector was provided by the Utah State Legislature during the 2008 legislative session.

The study was to determine the feasibility and environmental impacts of a lake crossing. However the funding was removed after significant cuts were made to the state’s budget later that year.



D. Planned North - South Corridors: West of Utah Lake

North-South corridors have the potential of reducing the need to access I-15 and consequently diminish need for east-west transportation. The MVC will be a major component of North-South mobility. Additional projects, including construction of Foothill Blvd. and expansion of Redwood Road are identified in the LRTP for MAG. Saratoga Springs is the major municipality (within the study area) located directly on the west side of the lake, with the remainder of the land under Utah County jurisdiction. The two proposed projects serve to improve the flow of traffic for residents of Saratoga Springs as well as vehicles traveling along Utah Lake. The two projects include a new arterial, Foothill Blvd., west of Redwood Road (SR-68), and an expansion of Redwood Road. Both roads are planned to include a median/turn lane, wider shoulders, and landscaped park-strips with sidewalk, curb and gutter, with a total right-of-way width of 180 feet.

Table 3.2 – List of Transportation Studies

| EIS / Study - Website | Status | Project Purpose / Description |
|--|--|--|
| SR-68 /Redwood Road http://www.udot.utah.gov/sr-68south | <ul style="list-style-type: none"> EIS Complete Record of Decision issued Under Construction | "The Utah Department of Transportation is widening SR-68 (Redwood Road) from Bangerter Highway on the north to 400 South in Saratoga Springs on the south. At completion, the road will accommodate two travel lanes in each direction to increase capacity and make the transportation system work better. The road will also feature a continuous, center-running turn lane throughout the corridor and widened shoulders to improve safety." |
| SR-114 / Geneva Road EIS http://www.udot.utah.gov/geneva | <ul style="list-style-type: none"> EIS Complete Record of Decision to be completed in winter of 2008 Currently not funded. Unknown start of construction | "The purpose of this project is to meet current and future traffic demands in this portion of Utah County. Alternatives will be created to meet the traffic needs and may include a no-action alternative, various Geneva Road widening alternatives, and off-corridor alternatives between Geneva Road and Utah Lake and between Geneva Road and I-15. The project team will conduct an in-depth analysis of each alternative and their potential impacts to determine a preferred alternative for the Geneva Road corridor." |
| I-15 - Utah County http://www.udot.utah.gov/i15utahcounty | <ul style="list-style-type: none"> EIS Complete. Record of Decision issued Construction expected in 2010 | "UDOT has decided to proceed in preparing the FEIS with 'Option D' as the Preferred Option in the Provo-Orem area. 'Option D' consists of a flyover for the I-15 southbound exit to University Parkway eastbound, a direct connection to UVSC from the I-15 northbound exit at University Parkway, and total reconstruction of the Provo Center Street interchange." |
| Provo to Salt Lake FrontRunner http://www.rideuta.com | <ul style="list-style-type: none"> EIS Complete Under Construction | "The 45-mile commuter rail line will extend from Provo in Utah County to Salt Lake City in Salt Lake County. UTA will own and operate the commuter rail line. It will be constructed in an existing rail corridor on UTA-owned right-of-way located adjacent to the existing Union Pacific Railroad (UPRR) right-of-way. The commuter rail service will have eight stations. Bus service will be rerouted to serve the new commuter rail stations and each station will also provide parking for passenger vehicles." |
| Mountain View Corridor http://udot.utah.gov/mountainview | <ul style="list-style-type: none"> EIS Complete Record of Decision issued | The Mountain View Corridor EIS was recently completed. The 2100 North alternative was chosen as the connection between MVC and I-15. MVC will terminate at SR-73 |
| Lehi, East-West Connector Pioneer Crossing (1000 South, Lehi) http://www.udot.utah.gov/ewconnector | <ul style="list-style-type: none"> ES (Environmental Statement) Complete Construction expected in 2009 | "The Utah Department of Transportation is examining the community transportation needs and impacts of an east-west corridor between I-15 and Redwood Road. Geographical boundaries of the study include the area north of Utah Lake, from Redwood Road to I-15; and south of Lehi Main Street to about 1500 South." |
| Provo Westside Connector (Provo Airport Road) http://www.provowestsideconnector.com/ | <ul style="list-style-type: none"> Purpose and Need statement completed Public hearing on final decision in 2009 Study will determine feasibility | "Provo City is conducting an Environmental Impact Statement (EIS) study to evaluate transportation and access needs between the Provo City Municipal Airport and I-15, in cooperation with Utah Department of Transportation (UDOT) and the Federal Highway Administration (FHWA)." |
| Vineyard Connector (East Lake Parkway) http://udot.utah.gov/vineyard | <ul style="list-style-type: none"> Study still being conducted Study completion and begin construction expected 2009 | "The Utah Department of Transportation is conducting an environmental study to develop a roadway between Orem and American Fork on the west side of I-15. Named the Vineyard Connector, this corridor is being studied with the intent of addressing some of the transportation challenges faced by the communities of American Fork, Lindon, Pleasant Grove, Vineyard, and Orem." |
| Bus Rapid Transit http://provo-oremrapidtransit.info | <ul style="list-style-type: none"> Study still being conducted Preferred alignment identified Construction is likely Unknown start of construction | "The current planned termini for this project are the planned Orem intermodal center near UVSC on the north and a location near the Provo Towne Center Mall and East Bay Business Complex (Novell Campus) on the south. The general location of the corridor is on or near University Avenue and University Parkway in Utah County." |
| North Utah County East/West Study http://utahcountyeastweststudy.com | <ul style="list-style-type: none"> Ongoing corridor study Alternatives are being developed | "The Utah County East-West Corridor Study is associated with House Bill 108 which provides funding to study east-west mobility along the Wasatch Front. The study will identify transportation projects and strategies to satisfy travel demand, alleviate congestion, and promote long-term corridor preservation through the year 2040. This study aims to be comprehensive and coordinated by incorporating growth projections and planned transportation projects for the area. Ultimately, the Utah County East-West Study will provide transportation solutions to connect communities while sustaining the economy, air quality maintenance, and quality of life in the northern Utah County region to the greatest extent possible." |
| North Valley Connectors Study http://www.mountainland.org/index.php?option=com_content&task=view&id=60&Itemid=22 | <ul style="list-style-type: none"> Corridor study Completed January 2002 | "The Purpose of the North Valley Connectors study (NVCS) is to evaluate the east-west transportation needs in the northwest Utah County area west of I-15 and north of Utah Lake. At the onset of the NVCS project, Mountainland Association of Governments (MAG), the project sponsor, identified two primary objectives of study: -Develop short range (0-10 year) alternatives to alleviate congestion on SR-73 (Main Street) through downtown Lehi. -Evaluate the long range (10-30 year) east-west transportation needs within the study area." |
| Lake Mountain Transportation Study http://www.mountainland.org/index.php?option=com_content&task=view&Itemid=22 | <ul style="list-style-type: none"> Corridor study Completed September 2006 | "The Mountainland Association of Governments initiated this study with two primary objectives: first, to work with local governments to identify future transportation problems in the fast-growing Lake Mountain area of Utah County; and second, to define transportation projects and strategies that will satisfy projected travel demand in the study area in both the short and long terms." |
| Nebo Transportation Study http://www.mountainland.org/index.php?option=com_content&task=view&id=44&Itemid=22 | <ul style="list-style-type: none"> Ongoing corridor study | The Nebo Transportation Study is one of the Quadrant Studies initiated by Mountainland Association of Governments (MAG). This study will look at state and local transportation projects in the southern portion of Utah County based on population and employment projections for 2030. The study results will be a combination of recommendations specific to the western region of the county. |

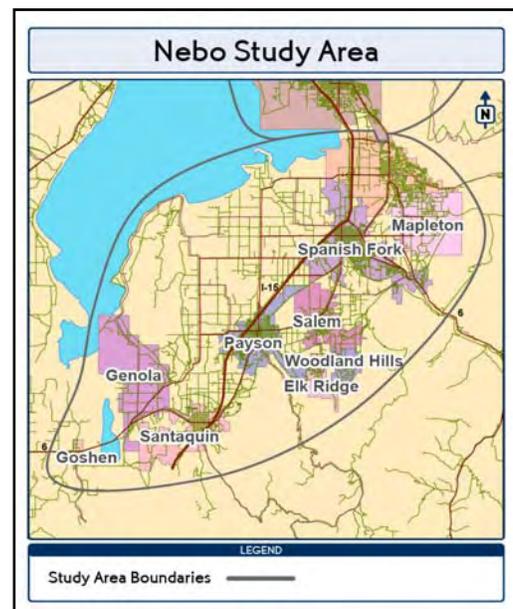
E. Planning for North-South Corridors: East of Utah Lake

The corridors planned adjacent to the eastern shore of Utah Lake make up the bulk of the 13 studies in Table 3.2. They will potentially allow additional traffic circulation to access points to Utah Lake. In an effort to alleviate the congestion on I-15, several corridors have been proposed running parallel to I-15. Among these proposed corridors, the most imminent are:

1. Vineyard Connector (East Lake Parkway of MAG's LRTP)
2. Geneva Road / SR-114 route
3. Nebo Loop Connector – Belt Route from Provo Airport south to Payson east to Mapleton

The Vineyard Connector environmental study has not yet identified a preferred alternative, while the Geneva Road study is scheduled to announce the preferred alternative in the near future. The purpose of the Vineyard Connector is to identify a corridor from approximately 800 North and Geneva Road in Orem on the south to the I-15 interchange at American Fork Main Street on the north. The Geneva Road study is investigating the best alternatives to deal with the existing section of Geneva Road / SR-114, “from Provo Center Street to State Street in Pleasant Grove and a section of Provo Center Street between Geneva Road and I-15 (which is also a part of State Route 114).”

The Nebo Transportation Study is conducting preliminary investigations of two other “vision” projects along the east shore of Utah Lake and across Provo Bay. The first project, titled the “Nebo Loop Corridor – Provo to Mapleton via Payson” considers a route across Provo Bay, crossing I-15 in Payson where it would complete a loop of the southern portion of the valley. This loop would connect to US-6 and eventually connect to the second “vision” project titled “University Ave / Spanish Fork Main St Connector – Provo to Spanish Fork,” passing parallel to I-15 to the west along the shoreline of the lake and tie-in to University Avenue at I-15. This entire loop would serve as a bypass to I-15 for the majority of the local communities at the south end of the valley, helping to alleviate I-15 and local road traffic as well as alleviate traffic congestion between US-6 and the airport. Foreseeing the need for connections to the Southwest parts of the lake, SR-68 will need improvement.



Three other corridors have been identified by MAG to further connect the western bypass of I-15 along the east shore of Utah Lake.

1. Provo 3110 West (Lakeshore Drive)
2. Provo Westside Connector (I-15 to Provo Airport)
3. Provo Northwest Connector (West of Geneva Rd)

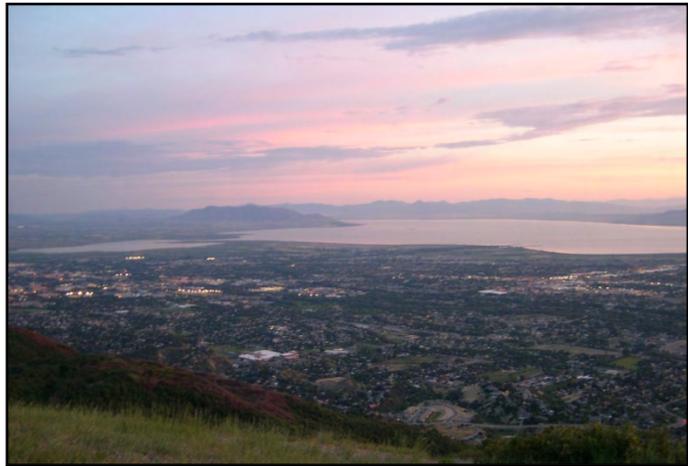
These three corridors would serve to establish more direct routes to access the airport for the Orem and southern Provo areas. Provo has incorporated the generally outlined location of the routes into its transportation plan as defined by MAG. These corridors will improve mobility to the Provo Airport.

F. Other Roadway Corridors Affecting Utah Lake

Important to note are several projects planned at the local level that are not included in MAG's LRTP. These projects are outlined by local agencies in their own long-range plans and may have an impact on how traffic moves to and from Utah Lake. As was previously stated, Saratoga Springs, Lehi and American Fork have adopted plans to connect I-15 to SR-68 along the north shore of the lake. In addition, all three municipalities have also planned several collectors and arterials to connect to this route and provide a relatively quick bypass around the lake. American Fork has also planned a route along 100 West to the American Fork Boat Harbor.

The Town of Vineyard has planned several local roads, parkways and boulevards that would serve to connect their community and utilize the Utah Transit Authority's (UTA) proposed intermodal hub located on the former site of the former Geneva Steel mill. Vineyard has also planned a boulevard connector from the 1600 North intersection with the UTA line, although Lindon does not show a similar connector within their city limits. It is possible, however, that these plans have not been updated as they are constantly changing and evolving to meet the needs of their communities. Other corridors planned along the eastern shore include Provo City's planned widening of West Center Street.

Of further mention is the lack of expected development towards the south end of the lake. Currently, there are no plans to develop any roadways or corridors in or around Genola Town, nor does the Utah County transportation plan make any mention of any planned corridors through the unincorporated areas along the shores of the lake. This is likely due to the current growth focus along the northern portions of the lake. As development along those parts of the lake reach capacity, further development may be realized along the southern portions of the lake, but MAG is not foreseeing this occurring until after the year 2050.



Springville City has no plans to extend roadways to access Utah Lake; however, Main Street, Spanish Fork, will be extended north by the city. Map 3.2 is a map prepared by MAG illustrating the road projects considered regionally significant throughout Utah County.

G. Planned Mass Transit

There are significant mass transit developments that are planned at the regional levels that may have a potential impact on Utah Lake by providing connectivity to access points to the lake. The most noteworthy of these plans is the UTA Provo to Salt Lake FrontRunner. This commuter rail line is planned to be implemented along the existing or abandoned rail lines used by the Union Pacific Railroad (UPRR). The rail lines run directly through the site of the former Geneva Steel plant in Vineyard. The FrontRunner line is planned to follow those same lines with intermodal hubs (stations) located in Vineyard at the former Geneva Steel plant site, Provo University Avenue, Orem University Parkway, the American Fork interchange and Lehi at Thanksgiving Point. This line and its stations will act as centers for traffic, allowing users to commute to and from the Salt Lake Valley in a fast, economic manner, while alleviating traffic on I-15.

In addition to the FrontRunner commuter rail (phase 1), MAG has also identified a phase 2 project to be built between 2016 and 2025 as an extension of the commuter rail from the Provo Intermodal Station (600 South Freedom Blvd) to Payson. There is also a “vision” project that would extend the commuter rail line to Santaquin. There is another “vision” project for light rail connecting a future light rail line in Lehi to the Provo Intermodal Station.

The additional planned transit projects adjacent to Utah Lake are designed to provide access and mobility to the FrontRunner commuter rail line. The Bus Rapid Transit study presented in Table 3.2 focuses on the development of a campus connector, connecting BYU and UVU with the intermodal hubs for the commuter rail in two locations. Saratoga Springs has planned several bus routes to connect the southernmost portions of their city with Eagle Mountain and Lehi. These routes will further serve to connect the eastern and western portions of the valley with the planned major commuter rail lines. Map 3.3 is a map prepared by MAG illustrating the transit projects considered regionally significant throughout Utah County.

H. Utah County and Other Utah Lake Trails

Trails around Utah Lake include those developed in Saratoga Springs as required for land development and trails developed by Utah County. The Utah County trail between the Provo River and Jordan River is partially developed. The County continues to work towards completing the gaps in this trail. The Saratoga Springs trail extends from the Jordan River to a point north of El Nautica Marina. Map 3.5 shows both the existing and currently planned trails for around Utah Lake. Map 3.4 is a map prepared by MAG illustrating all the trails being considered by MAG throughout Utah County.



I. Provo Airport

One of the major modes of transportation that has a potential effect on Utah Lake is the Provo Airport. Located along the eastern shore within Provo City Limits, the airport serves primarily local businesses and other private entities within Utah County and surrounding areas. As much as 19 percent of all air traffic is generated solely by Provo residents. The airport currently operates with two runways measuring 8,600 feet and 6,602 feet long. With approximately 175,000 operations per year, the airport is a very busy airport and serves a vital role in transportation for the community. Accordingly, it is listed in the 1998 National Plan of Integrated Airport Systems (NPIAS) (Federal Aviation Administration, 1998) as well as in the Wasatch Front Regional Council's 1998 update to the Metropolitan Airports System Plan (MASP) as a general aviation facility. “Prior to September 11, 2001, the Federal Aviation Administration projected that activities at the Provo Airport would double by 2015. Although operations have continued to grow at the airport in the form of take-offs and landings - freight has diminished” (MAG, 2007 Regional Transportation Plan). Given the importance of the airport to the region, projected growth, as well as proximity to Utah Lake, Provo City has developed the Provo Airport Master Plan to guide any future development of the airport and its surroundings.

The current plan as proposed by Provo City is to maintain the airport as a general aviation facility rather than a large commercial facility. They are also planning to develop facilities to accommodate larger, commercial aircraft to prepare for any changes. “The Metropolitan Airport Systems Plan, adopted by Provo City in 2000, shows expansion of the airport with construction scheduled in the coming years. With a new tower built and when a radar system is in operation, commercial air service is anticipated.



The city has had numerous inquiries from carriers that may be interested in starting service if the city is able to provide ground handling services. Provo City has assured potential carriers that they can provide the necessary ground services as well as security screening.” (MAG, 2007 Regional Transportation Plan). An additional runway (approximately 4,400 feet long) is planned parallel to the larger of the existing runways. Given these planned improvements, the airport is expected to handle the projected growth for at least the next 10 years. No plans have been made to further encroach on Utah Lake as the land within the current airport boundaries is sufficient for the proposed improvements.

J. Issues and Trends

The primary transportation issue challenging planners is the movement of traffic east and west from the communities of Saratoga Springs and Eagle Mountain. This issue has resulted in numerous studies and remains a very critical issue. The trend is that growth in those communities will continue and a resolution to east/west transportation needs to I-15 will increase in importance.

Gaps in study of transportation issues related to traffic around the lake are being addressed by MAG and UDOT with the numerous studies being conducted. As destination points around the shore of Utah Lake are identified, it will be necessary to assess the local transportation issues associated with those destination points. Currently, none of the studies by UDOT or MAG focus on Utah Lake destination points.

The completion of the Utah Lake trail system is progressing slowly but the trend will be for communities to include this trail and other trails around Utah Lake as part of their approval for development.

IV. NATURAL RESOURCES

A. Historical Setting

Utah Lake was formed when Lake Bonneville receded approximately ten thousand years ago. It is a shallow, turbid lake with high biologic productivity. It is 24 miles long (north-south) and 5 to 13 miles wide. Major earthquakes 10,000 years ago deepened Utah Lake as much as 20 feet but sediments have since deposited 15-20 feet (Merritt, 2008). Sediments are comprised of precipitate calcium carbonate, organic material (algae and plants) and sediment carried into the lake from rivers and streams. Sedimentation averages 2 inches per 100 years (Merritt, 2008). The lake is biologically productive, resulting at least partially from the abundance of nutrients, phosphorus and nitrogen, in the water. These nutrients contribute to the growth of algae in the water. Significant changes to Utah Lake since the arrival of pioneers 150 years ago include:

1. Introduction of invasive, non-native fish and plant species
2. Use as regulated reservoir
3. Discharges from treatment plants, industries and stormwater runoff

Utah Lake is one of the largest natural freshwater lakes west of the Mississippi. Located in a low lying basin west of the Wasatch Mountain Range near Provo, Utah Lake has been an important resource since the early history of Utah. Numerous wetlands and waterways are associated with the lake, providing habitat for wildlife, including sensitive species. Three nature preserves have been established to protect waterfowl habitat and wildlife species.

B. Shallow Lake Ecology and Utah Lake

Shallow lakes typically have the potential for two alternative stable ecological conditions, a clear water state with a rich array of rooted aquatic plants (macrophytes), and a turbid water (muddy water) state driven by single-celled algae (phytoplankton) production. The pristine condition of most shallow lakes is the clear-water state. Large lakes, like Utah Lake, have the potential for different areas to be clear or turbid. Wind driven turbidity may occur in the open water areas while near-shore areas may maintain clear water conditions (Scheffer, 1998). The condition of Utah Lake upon settlement in the late 1800's is somewhat uncertain.

The progression of clear water shallow lakes to the turbid state has typical patterns. Increased nutrient loading by human activities triggers the following consequences:

1. An increase in phytoplankton abundance causes aquatic plants to be covered with algae, inhibiting their ability to photosynthesize.
2. Increased phytoplankton in the water column reduces light penetration and this additional shading causes collapse of the aquatic vegetation community.
3. With rooted aquatic vegetation gone, the aquatic insects associated with the vegetation disappear along with the animals, fish and birds that feed on them or the plants.
4. The refuge that the aquatic plants provided is gone resulting in major shifts in predator-prey relationships.
5. Without aquatic plants, near-shore wave activity is not suppressed and sediments in suspension increases turbidity.
6. The aquatic invertebrate community becomes dominated by bottom dwelling insects (midges).
7. The fish community becomes dominated by bottom feeding species (carp).
8. Bottom feeding fish stir up sediments, further contributing to high turbidity.

Disturbances that likely contribute to Utah Lake's existing turbid state include:

1. elevated nutrient loading from agricultural runoff and wastewater disposal,
2. the introduction and establishment of common carp,
3. wind and wave action, and
4. lake fluctuations.

Habitat alteration, overfishing, and competition and predation with nonnative fish has reduced or eliminated Utah Lake's native fish populations. Non-native species were introduced as an alternative food source after overfishing reduced native populations and later additional nonnative fish were introduced for the purpose of establishing sport fisheries. Invasive plant species are outcompeting native plant species for resources along the shoreline and shallow water areas of the lake.

The following sections characterize in further detail Utah Lake's key natural resources and the issues confronting them.

C. Rivers, Streams and Water Uses

Utah Lake receives water from precipitation, rivers, streams, canals, and groundwater within the watershed (see Map 4.1). Water leaving the lake flows by way of the Jordan River, which eventually flows into the Great Salt Lake. The hydrology of the Utah Lake basin has been altered by canals that divert water from the tributary rivers and streams to Salt Lake Valley and Utah Valley communities, transbasin diversions such as the Weber/Provo diversion canal; the Duchesne and Strawberry tunnels; upstream reservoirs including Jordanelle, Deer Creek, and the upper Provo River lakes; and by discharges



from wastewater treatment plants. Of all the sources that provide water to Utah Lake, surface inflows (including natural streams and flows from wastewater treatment plants) are the largest contributors, accounting for 61% of total inflows (Division of Water Quality, 2007).

Surface water enters the lake from many sources. Fuhriman *et al* (1981) identified a total of 52 inflow sources. The three largest tributaries are the Provo River, Spanish Fork River and Benjamin Slough. Surface water outflow from Utah Lake occurs only to the Jordan River, located on the north end of the lake and averaged 428,200 acre-feet per year (1980 through 2003) (Division of Water Quality, 2007). Evaporation averages 349,800 acre-feet per year for the same period. Table 4.1 summarizes the annual average inflow to Utah Lake from major surface water sources.

Table 4.1 – Average Annual Inflow to Utah Lake

| Tributary | Average Annual flow (acre-feet/year) |
|----------------------|---|
| Provo River | 137,858 |
| Spanish Fork River | 67,308 |
| Benjamin Slough | 33,786 |
| Mill Race | 26,414 |
| Geneva Steel Drain | 18,358 |
| Hobble Creek | 15,727 |
| Steel Mill Drain | 15,654 |
| Powell Slough | 15,251 |
| Geneva Cannery Drain | 15,136 |
| Mill Pond | 11,701 |
| Dry Creek | 10,224 |
| Other | 56,522 |
| Total | 426,939 |

Modified from Boyd and Cassel (2005).

In addition to surface flows, groundwater is another significant source of inflow to Utah Lake. Groundwater enters the lake via three types of flow: freshwater springs; diffuse fresh seeps; and mineralized springs (Brimhall and Merritt, 1981; Fuhriman *et al*, 1981). Most of these sources of groundwater inflow are concentrated in a north-south trending band that occupies much of the eastern half of the lake, from Bird Island to American Fork (Brimhall and Merritt, 1981).

The first 125,000 acre-feet of active storage in Utah Lake serves only primary storage rights. After these rights have been satisfied, 585,000 acre-feet is available to both primary and secondary rights until it is all used, at which time the secondary rights are shut off. (Division of Water Rights, 1993). The “Board of Canal Companies Presidents” oversees the operation of the pumping station, which is used to deliver water in low lake level conditions. The water commissioner duly appointed by the State Engineer, as recommended by the water users, oversees the operation of the releases to the Jordan River. Pumped deliveries are coordinated with downstream water use demands. Flood releases are made in accordance with the 1985 compromise agreement.

Diversions upstream from Utah Lake occur on essentially all the streams entering the lake. The Provo River has the greatest upstream diversions, including diversion to storage in Deer Creek and Jordanelle Reservoirs and in smaller reservoirs in the Uintah Mountains. These diversions reduce inflow to Utah Lake from what would occur naturally. Return flows to Utah Lake from upstream diversions also usually contain additional nutrients and other dissolved solids.

The purpose of the Central Utah Project (CUP) is to develop a substantial portion of the Colorado River water allotted to the State of Utah under the Colorado River Compact. Initially under the supervision of the USBR, the CUP is now under the management and control of the Central Utah Water Conservancy District (CUWCD) with direct oversight by the Department of

the Interior. The Bonneville Unit, which is the largest unit of the CUP, serves Salt Lake, Utah, Wasatch and Duchesne counties. Utah Lake is the hub of the Bonneville Unit system and operation of Utah Lake is key to allowing for water exchanges from Strawberry to Jordanelle Reservoirs which make CUP deliveries possible. This is accomplished by replacing Utah Lake water held in Jordanelle Reservoir with releases to Utah Lake from Strawberry Reservoir.

The lower segment of the Provo River between Provo Canyon and Utah Lake is heavily diverted for irrigation by eight diversion structures from the Murdock Diversion Dam, near the mouth of Provo Canyon, to Utah Lake (Utah Reclamation Mitigation and Conservation Commission, 2008). Utah Lake and two other major reservoirs, Deer Creek and Jordanelle, store the majority of the water flowing into the Bonneville Basin for use in irrigation, municipal, and industrial uses.

Groundwater diversions have the potential for reducing inflow to and water quality of Utah Lake. The U.S. Geological Survey is conducting on-going groundwater modeling of North Utah County and Cedar Valley to evaluate the impacts of groundwater withdrawals.

Water use trends for both Utah Lake water (Salt Lake County) and areas contributory to Utah Lake in Utah County are towards urbanization of irrigated farmland. As farmland is urbanized, many communities require the water previously used for irrigation to be conveyed to the municipality. Furthermore, major water wholesalers, such as Central Utah Water Conservancy District and Jordan Valley Water Conservancy District have acquired rights to irrigation water for conversion to municipal use. Water is diverted into Utah Lake from Strawberry Reservoir via the Diamond Fork Pipeline as exchange for water that is stored in Jordanelle Reservoir. This trend results in less return flows to Utah Lake from farmlands and increased treated wastewater effluent and stormwater runoff returning to Utah Lake.

D. Vegetation

Map 4.2 provides a generalized description of plant communities surrounding Utah Lake. In undeveloped areas, Utah Lake shoreline has a diverse plant community typical of the region. Vegetation surrounding the lake includes areas dominated by mountain sage brush, grass, and sedges. Brotherson (1981) identified 483 plant species, from seven major vegetative communities. These communities include: pondweed; bulrush-cattail marshes; grass rush-sedge meadows; lowland woody; saline terrestrial; and annual herbaceous. Utah Lake contains several areas with known populations of Ute ladies' tresses, an orchid that is federally listed as threatened species. Habitat for Ute ladies' tresses is associated with wetlands and riparian areas.

Phragmites (Phragmites australis), a non-native invasive species, currently dominates some shoreline and seasonally submerged parts of the lake, replacing native species (primarily bulrush and cattail). Craig Searle, Utah County Weed Control Supervisor, estimates that currently there are approximately 6,000 acres of phragmites around Utah Lake and its tributaries. This introduced species is aggressively replacing native species and in many areas has created a dominant monoculture. As a result, the spread of phragmites around the lake has become a serious concern. Other non-native invasive species that are found around Utah Lake and are designated as noxious weeds by either the State of Utah or Utah County include tamarisk (*Tamarix ramosissima*), perennial pepperweed (*Lepidium latifolium*), Canada thistle (*Cirsium arvense*) and purple loosestrife (*Lythrum salicaria*). Russian olive (*Elaeagnus angustifolia*) is also a non-native species but has not been designated as a noxious weed. Utah County has an on-going noxious weed control program. This work includes many areas around Utah Lake and targets both phragmites and tamarisk. Craig Searle estimates that without a control program within 20 years phragmites will dominate the shoreline of Utah Lake. Tamarisk is being actively treated using a defoliating leaf beetle with significant success. However, without a native vegetation restoration program, other invasive species will replace the tamarisk.

Currently, there is no native vegetation restoration program. Searle also estimates that 800 to 1000 acres of phragmites could be removed per year, resulting in its control in 8 to 10 years, requiring an on-going maintenance program.

Aquatic vegetation has been severely impacted by the introduction of carp to Utah Lake. The lack of aquatic vegetation has contributed to the decline of native fish species and reduced water clarity near the shore. Results from research efforts conducted by the June Sucker Recovery Implementation Program (JSRIP) suggest that reducing and controlling the carp population is feasible; however, limited funding and logistical constraints have delayed the implementation of a full-blown effort. Scientific literature (see Scheffer 1998) suggests that reducing the carp population by 75% and maintaining it at that level is a prerequisite for the re-establishment of aquatic vegetation..

E. Wetlands

Wetland ecosystems serve as an important breeding area and habitat for migratory birds, improves water quality and controls floods and the inflow/outflow of water of the lake. Wetlands around the lake can provide flood storage areas that mitigate flooding of areas with greater elevation. Wetland characteristics for Utah Lake vary from riverine, riparian, scrub-shrub, emergent and deep water habitats.

The aquatic and semi-aquatic plant communities form a band of vegetation on the shoreline that varies in width from 20 meters (65.6 feet) or less on the western shore to 400 meters (1312 feet) on the eastern shore (Brotherson, 1981). Freshwater emergent wetlands comprise approximately 8,411 acres, freshwater forested/shrub wetlands total 572 acres, and 46 acres are in riverine wetland.



The Utah Lake Wetlands Preserve was established to partially mitigate for past and anticipated future impacts of the Central Utah Project. It is located near the southern end of Utah Lake and consists of a mix of wetland and upland habitats (Utah Reclamation Mitigation and Conservation Commission, 2008). The preserve consists of two units adjacent to the lake. Portions of the Goshen Bay unit and the Benjamin Slough unit are within the Utah Lake study area. The locations of the two units are shown on Map 4.3. The 21,750-acre preserve provides habitat for numerous species, including small mammals, fish, birds, amphibians and reptiles.

As urban growth and roadway construction continue in Utah County, non-wetland areas adjacent to existing wetlands near Utah Lake would have great potential as wetland mitigation sites with available water and suitable topography. As urban growth continues in Utah County, the need for replacement wetlands will also grow, making these potential sites for mitigation of greater interest for this purpose. The U.S. Army Corps of Engineers is the federal agency responsible for the protection of wetlands under Section 404 of the 1977 Clean Water Act. Their policy, when evaluating proposals, is to first require avoidance; second, minimizing impacts; and third mitigation of impacts.

F. Special Designation Areas

Special Designation Areas (non-governmental organizations)

Special status designations by non-governmental organizations exist for several areas in the Utah Lake study area. The National Audubon Society has identified areas on and near the lake as Important Bird Areas (IBA) which include Goshen Bay and Provo Bay. Provo Bay IBA is recognized for its importance to migrating waterfowl, and the Goshen Bay IBA is recognized for the number of shore and wading birds that use that area. The National Audubon Society has no direct land-use regulatory power over lands that it does not own, but works with affected landowners and managers to achieve the habitat preservation purposes of the IBAs.

Utah Lake was identified as one of eight Utah focus areas in 1995 by the Intermountain West Joint Venture (IWJV, 2005). The IWJV is a public-private partnership, established in 1994, to identify, protect and restore key wetlands through implementation of the 1986 North American Waterfowl Management Plan (NAWMP). In 2002, Congress re-authorized \$75 million/year for the NAWMP. In 2001, the IWJV prepared a proposal and received a \$1 million grant for acquisition and protection of certain wetlands around Utah Lake. However, the infrastructure for utilizing and matching (50% match) the grant was not in place, so the funds were returned to the program. Future cooperative efforts for preserving wetland habitat might be eligible for similar funding.

Special Designation Areas (governmental agencies)

Special status designations by governmental agencies include

1. mitigation wetlands (wetlands constructed to mitigate wetlands losses at other sites) administered by the U.S. Army Corps of Engineers (USACE)
2. stream alterations of navigable waters of the United States (also administered by USACE) and
3. a special federal designation of a portion of Provo Bay resulting from the Central Utah Project Completion Act.
4. critical habitat for the June sucker on the lower Provo River

USACE has several mitigation wetlands within the Utah Lake study area. However, they do not maintain a current map or database of all the sites but they are administered individually. Two known proposed sites include a site north of the DCD transfer station. Another site, Hobble Creek Wetland area, is located on the east shore of Provo Bay (see Map 4.3 – Wetlands). These sites are mitigation wetlands for UDOT and UTA transportation projects respectively.

USACE also has jurisdiction over stream alterations. This requires permitting for any construction activities within Utah Lake, the Jordan River and all of the tributaries to Utah Lake. Some permitting review and approval responsibilities have been given to DEQ.

As part of Public Law 102-575, Sec. 306(d), Central Utah Project Completion Act, the U.S. government prohibited any Federal permits for commercial, industrial or residential development on a portion of the southern shore of the bay. It is described as starting at the mouth of the Spanish Fork River, extending east to the Provo City boundary and extending 2,000 feet into the lake from ordinary high water line.

The lower Provo River, from Utah Lake to a point 4.9 miles upstream, was designated on April 30, 1986 by the EPA as critical habitat for the June sucker, an endangered species². This

² <http://www.junesuckerrecovery.org/>

reach of the Provo River is the primary spawning habitat and is consequently critical to recovery of the June sucker. This habitat is shown on Map 4.1, Rivers and Streams.

Resource Preservation Areas – Eight areas around Utah Lake have been identified as Resource Preservation Areas with the intention of managing them for different purposes including habitat for wildlife, restoration, conservation and preservation. These properties along with descriptions of why the areas were so designated and associated development restrictions are described below. They have also been identified on the Management Classifications Map; Figure 2.4 on page 16 the Utah Lake Master Plan.

1. McLachlan Property (FFSL): This property found on the North shore of Utah Lake was obtained by the Utah Division of Forestry, Fire & State Lands as part of the boundary settlement proceedings for the purposes of creating a wildlife preserve.
2. Powell Slough: This federally owned property is a highly-valued wetland system that is to be managed for wildlife purposes, specifically the June sucker. There are development restrictions associated with this area.
3. Taylor Property: A Conservation Easement was recorded on the property on November 15, 2000 between the property owner Paul H. Taylor and The Nature Conservancy, a District of Columbia non-profit corporation. The primary purpose of the Easement is to preserve and protect in perpetuity and, in the event of their degradation or destruction, to enhance and restore the wetlands and relatively significant natural features and values of the property. It was also set aside to conserve important habitat for wildlife; to protect rare or unique native plants; and to conserve the wetlands communities and the wildlife inhabiting these communities.
4. Despain Property: This land was set aside to assure that it will be retained forever in its natural, scenic, agricultural, and/or open space condition and to prevent any use of the property that will impair or interfere with the conservation values of the property. A Conservation Easement was recorded on the property on December 31, 2001 and is called the K. Dale and Sonja Despain Cattle Ranch and Bird Refuge Conservation Easement. Permissible land uses include farming, ranching, management of wildlife habitat, and scientific research or education.
5. Provo City Wetland Mitigation Site: Provo City designated this property as wetland mitigation property for impacts to wetlands caused by its airport expansion. It was also established to provide habitat for birds and wildlife, and for preservation of natural and scenic beauty. The property is to be conserved and preserved in the condition it existed when the Easement was granted in May, 2000. The property cannot be developed in any way that would be detrimental to the preservation of the natural and scenic beauty and resources of the property.
6. Hobble Creek Restoration Project: The June Sucker Recovery Implementation Program (JSRIP) purchased property along lower Hobble Creek and has completed a project to restore a naturally functioning wetland and delta where Hobble Creek enters Utah Lake in order to provide an additional spawning habitat for June sucker. This area has been designated as a wetland mitigation site and is managed by the Utah Division of Wildlife Resources (UDWR). Much of the restoration work was funded by the Utah Transit Authority in fulfillment of a portion of their wetland mitigation required for their FrontRunner South project.
7. Benjamin Unit of the Utah Lake Wetlands Preserve: As part of the Central Utah Project Completion Act (CUPCA), Congress authorized a preserve to be established that included much of the area along and upland from Benjamin Slough. The Utah

Reclamation Mitigation and Conservation Commission (URMCC) is authorized to purchase lands in the preserve as they become available. Once acquired, they are managed according to federal law that establishes wildlife refuge management requirements. The Utah Division of Wildlife Resources manages this preserve in accordance with those requirements. There are no restrictions placed on private lands that fall within the preservation areas.

8. Goshen Bay Unit of the Utah Lake Wetlands Preserve: As part of the Central Utah Project Completion Act (CUPCA), Congress authorized a preserve to be established that included much of the area along and upland from Goshen Bay. The Utah Reclamation Mitigation and Conservation Commission (URMCC) is authorized to purchase lands in the preserve as they become available. Once acquired, they are managed according to federal law that establishes wildlife refuge management requirements. The Utah Division of Wildlife Resources manages this preserve in accordance with those requirements. There are no restrictions placed on private lands that fall within the preservation areas.

G. Wildlife

The shallow, diverse shoreline communities of Utah Lake provide habitat for numerous species of plants, and various forms of wildlife. Based on observations during 2002-2006, the diversity of birds at Utah Lake remained relatively unchanged. However, abundance of individual bird species seemed to vary according to water levels in Utah Lake (Personal communication with David Lee, CUP/Utah Lake Wetland Preserve Project Leader). Utah Lake currently provides numerous quality habitats for both resident and migratory birds.

The Utah Lake wetland ecosystem is important as a breeding area and stopover for many migratory birds in the Pacific Flyway. The Flyway extends from Alaska to Mexico and parallels the western foothills of the Rocky Mountains. Approximately 226 species of birds are known to use Utah Lake wetlands³. There are also 49 species of mammals; 16 species of amphibians and reptiles; and 18 species of fish (Utah Reclamation Mitigation and Conservation Commission 2008).

Forty-three species of wild mammals were identified around Utah Lake by the Division of Wildlife Resources, most of which are mice and squirrels. Muskrat is abundant, and is commonly found in Goshen Bay, Provo Bay and Powell Slough. The only large mammal identified by the Division of Wildlife Resources is the mule deer (Division of Wildlife Resources, 1982).

H. Fish

Thirteen native fish species originally inhabited Utah Lake. Of these native species, only the June sucker and the Utah sucker are still present. The demise of other species is due to the introduction of non-native fish species, over fishing and alteration and degradation of habitat (Carter, 2003). The introduced species have dominated the lake's fish community and have decreased the native species populations through competitive interactions and predation.

Restoring the ecological health of Utah Lake is impeded by the environmental impact of large numbers of common carp including loss of water clarity and biodiversity. In the most recent lake-wide survey conducted, common carp represented an overwhelming 91 percent of the fish biomass (weight) in the lake (Valdez, 2005). A lake-wide approximation of the carp population

³ www.mitigationcommission.gov/wetlands/wetlands_ulwp.html

is 7.5 million age 2+ harvestable-size fish (Valdez, 2005). Large-scale mechanical removal of carp from Utah Lake has been determined to be possible with commercial fishing techniques. The reduction and control of common carp represents a significant challenge. Utah Lake is a shallow lake that is ideal habitat for carp, and it is a foregone conclusion that the species will not be extirpated from the lake using existing technology. The goal of the removal program is to reduce the carp population below its reproductive potential so that their recovery is slow and controllable. Target reduction levels are based on scientific literature which suggests that an ecosystem-level response to the removal would include the restoration of rooted aquatic plants, increased biodiversity, more stable predator-prey interactions, and improved water quality.

Utah Lake is considered a warm water aquatic habitat that is conducive to supporting the numerous introduced sport fish species. White bass, walleye, carp, black bullhead, and channel catfish are found within the lake; with channel catfish, white bass and walleye being the primary focus of recreational anglers. Several panfish species, including perch and crappie, can also be found within the lake. A summary of recent creel survey is provided in the recreation section of this report. Loy Fisheries is the only commercial fishing operation on the lake. The operation harvests carp, which is the dominant non-native fish species and white bass.

The main portion of Utah Lake and Goshen Bay are important for adult sport fish and spawning habitat. Provo Bay is important habitat for young-of-the-year fish because of its high productivity (Radant, 1982).

In 2005, the JSRIP analyzed carp for heavy metals, pesticides and polychlorinated biphenyls (PCBs) which resulted in further study in 2007. In October 2007, the Utah State Health Department (USHD), Utah Department of Environmental Quality (UDEQ), and Utah Department of Natural Resources (UDNR) jointly issued a fish advisory for channel catfish and carp in Utah Lake. The advisory warned of levels of PCBs above standards established by EPA in samples taken of these species from the lake, and cautioned the public about consumption. Other species sampled included white bass, black bullhead and walleye, but these species did not have PCB levels that exceeded EPA standards. A study conducted in 2008 by UDEQ was unable to locate a point source for the contamination. In the study, 23 core samples were tested ranging from 6 to 53 cm in depth. All samples fell below the test's detection limits of 50 ppb. Because of these results, no further investigation by UDEQ is expected. However, there may be reason to continue testing in the future.

It is worth noting that the standard for PCBs used by the Food and Drug Administration (FDA) (2.0 parts per million (ppm)), which regulates the sale of commercially harvested fish, is less stringent than those set by EPA (0.02 ppm, cancer screening value; 0.08 ppm non-cancer screening value). PCB levels in Utah Lake carp fillets were found to be 0.081 parts per million. This level falls below the FDA standards; therefore, they can be sold on the commercial market without warnings or restrictions.

I. Endangered, Threatened and Sensitive Species

Within Utah Lake and its adjacent shorelines, there are many wildlife and plant species that are federally listed as threatened, endangered or listed by the State of Utah as Species of Concern.

Federal acts that protect certain plants and animals include:

- Endangered Species Act (ESA) (16 U.S.C. 1531-1544; ESA)
- Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d; BGEPA)
- Migratory Bird Treaty Act (MBTA)

The Migratory Bird Treaty Act (MBTA) ensures that all migratory birds and their parts, including eggs, nests, and feathers, will be fully protected.

Below are summaries of some of the key Utah Lake species that are threatened or endangered, and the habitat they require.

June Sucker (Chasmistes liorus)

The June sucker is endemic to Utah Lake and was listed by the U.S. Fish and Wildlife Service in 1986 as endangered with critical habitat (U.S. Fish and Wildlife Service, 1999). Critical habitat has been designated as the section of the Provo River from Utah Lake to Tanner Race Diversion (Columbia Lane). The June sucker can be found throughout Utah Lake and have been documented near many



of the tributaries, however the Provo River continues to be the main spawning location. Provo Bay has also been documented as being important habitat for June sucker. (Bueloh, 2006). The June Sucker Recovery Plan (U.S. Fish and Wildlife Service, 1999) identifies competition with and predation by introduced fish species, as well as reduction and modification to habitat and altered hydrology as the reasons the June sucker has decreased in population within the lake. The recovery plan goals are to 1) prevent extinction, 2) downlist to threatened status, and 3) delist the species. At the time of its listing in 1986, there was a population estimate of less than 1,000 individuals (U.S. Fish and Wildlife Service, 1999).

The JSRIP is a multi-agency cooperative effort that is intended to implement the June Sucker Recovery Plan by coordinating and facilitating the recovery of June sucker, while balancing and accommodating water resource needs of the human population. The Program focuses its activities on six recovery elements to ensure a diversified and balanced approach towards recovery. The recovery elements are 1) Nonnative and Sportfish Management, 2) Habitat Development and Maintenance, 3) Water Management and Protection, 4) Genetic Integrity and Augmentation, 5) Research, Monitoring, and Data Management, and 6) Information and Education.

Some JSRIP accomplishments by recovery element include:

Nonnative and Sportfish Management

The JSRIP has funded several studies investigating the impacts of non-native fish on the Utah Lake ecosystem and June sucker recovery. Evaluations of the various non-native fish in the lake identified the common carp as being the most detrimental to June sucker recovery and also implicated the carp in the destruction of aquatic vegetation. Additional studies on common carp have focused on assessing the population, evaluating control methods, and identifying potential commercial markets for the fish. The JSRIP has also funded the creation of a Utah Lake food web model and a survey of Utah Lake anglers.

Habitat Development and Maintenance

Early in its existence, the JSRIP conducted a study to identify the Utah Lake tributaries most capable of sustaining June sucker spawning. The study indicated Hobble Creek as the most feasible. A subsequent study was conducted to develop a conceptual plan to restore Hobble

Creek and improve conditions for June sucker. The JSRIP has since purchased property along lower Hobble Creek and has initiated a project to restore a naturally functioning wetland and delta where Hobble Creek enters Utah Lake. This area has been designated as a wetland mitigation site and is managed by the UDWR. Much of the restoration work was funded by the Utah Transit Authority in fulfillment of a portion of their wetland mitigation required for their FrontRunner South project. Similar restoration activities on Hobble Creek would provide additional benefit to the June sucker and other wildlife. The JSRIP has also studied alternatives for habitat enhancements along the lower Provo River and completed the NEPA process for removing the Fort Fields irrigation diversion on the Provo River.

Water Management and Protection for June Sucker

Through the Department of the Interior, the JSRIP has worked to secure water for instream flows in both Hobble Creek and the Provo River. The water has been used to provide for flows conducive to June sucker survival and also to sustain flows in the Provo River. The JSRIP works with other entities on the Provo River Flow Workgroup to make recommendations on the use of this water. Year round flow requirements necessary to benefit the Provo River ecosystem have also been researched. The JSRIP works with the USGS to maintain the Provo River at Provo gauging station. The JSRIP has also funded a study on the historic fluctuations of Utah Lake.

Genetic Integrity and Augmentation

A primary focus of the JSRIP has been to construct and develop a suitable hatchery program that allows the stocking of June sucker back into Utah Lake. The hatchery, in Logan, Utah, produces tens of thousands of June sucker annually that are stocked into Utah Lake. Multiple studies have been conducted to improve the health and survival of fish raised in the hatchery. Additionally, a refuge population of June sucker has been established at Red Butte Reservoir near Salt Lake City.

Research, Monitoring, and Data Management

Several studies have been conducted on the life history characteristics of June sucker and the ecological function of the Utah Lake ecosystem. June sucker research has included investigations on June sucker genetics, life stages, movement patterns, and survival. The JSRIP has funded research on sediment transport in Utah Lake tributaries and the development of a Utah Lake circulation model. The JSRIP also funds the monitoring of the Utah Lake fish community and sucker populations. A database is currently being developed to manage the large amounts of data collected.

Information and Education

The JSRIP has developed a media relations and public outreach plan that guides efforts to distribute information and provide educational materials to the public. The JSRIP maintains a website about the recovery program and has helped in the development of an informational kiosk at Utah Lake State Park. The JSRIP developed the Utah Lake: Legacy book, documentary, and study guide that are available for distribution to interested parties and have been used by local educators. The JSRIP has worked with other partners to conduct a Utah Lake Festival annually to encourage the public to visit and appreciate Utah Lake.

The portion of Hobble Creek directly west of I-15 has been designated as a wetland mitigation site and restored to function as a delta at the river-lake interface. The land is managed by the UDWR and much of the restoration project was funded by the UTA as a portion of the wetland mitigation required for their FrontRunner south project. The project improves rearing habitat for juvenile June sucker and provides wetland habitat for other wildlife. The JSRIP has identified

other restoration possibilities for Hobble Creek and other tributaries that would provide similar benefits.

Ute Ladies' Tresses (Spiranthes diluvialis)

In accordance with the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884) the Ute ladies' tresses was listed as threatened by the U.S. Fish and Wildlife Service in 1992 (Department of the Interior, 1992). Wetland areas associated with Utah Lake have several known populations of Ute ladies' tresses. Habitat has been identified on the east and north shore of Utah Lake. Threats to the orchid include loss of habitat from alterations of stream flows, grazing, weed infestation, heavy recreation and urbanization. Habitat is along riparian edges, gravel bars, oxbows and wet meadows.⁴



Ute ladies' tresses

Bald Eagle and Migratory Birds

The Bald Eagle has been removed from the endangered species list, but is still protected by the Bald Eagle Protection Act of 1940 (16 U.S.C. 668-668d, 54 Stat. 250) and the Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712; Ch. 128: July 13, 1918; 40 Stat. 755) as amended. The Division of Wildlife Resources (UDWR) reports that 25 to 30 percent of Bald Eagles west of the Rocky Mountains spend their winters in Utah. While Utah has only 11 nesting pairs of Bald Eagles, it has become the primary route for migrants. The Bald Eagle is a winter resident of Utah Lake and utilizes many different habitats for foraging, including the open water, riparian zones, grasslands, sagebrush, and agricultural fields (Pritchett *et al*, 1981).

Other avian conservation priority species that are listed by the Division of Wildlife Resources for the Central Region, which includes Utah Lake, are Lewis Woodpecker (*Melanerpes lewis*), American Avocet (*Recurvirostra americana*), American White Pelican (*Pelecanus erythrorhynchos*), Bobolink (*Dolichonyx oryzivorus*), Long-billed Curlew (*Numenius americanus*), Black Swift (*Cypseloides niger*), Black-necked Stilt (*Himantopus mexicanus*), Broad-tailed Hummingbird (*Selasphorus platycercus*), Yellow-billed Cuckoo (*Coccyzus americanus*), and Black-throated Gray Warbler (*Dendroica nigrescens*) (Division of Wildlife Resources, 2007).

Other State Species of Concern

The UDWR proactively manages species of concern to avoid Federal listing under the Endangered Species Act. The Utah Wildlife Comprehensive Wildlife Conservation Strategy (Division of Wildlife Resources, 2005) is the guiding document for managing Utah sensitive species and habitats.

Mammals with habitat near Utah Lake include the kit fox, spotted bat, and western red bat.

Bonneville cutthroat trout, Columbia spotted frog, and least chub historically occurred in the Utah Lake area, which is still considered potential habitat for restoration.

J. Aquatic Invasive Species

Aquatic invasive species (AIS) are defined as water-associated non-native plant and animal species, which, due to their uncontrollable population growth, cause ecological instability of infested waters, or economic damage to commercial, agricultural, aquacultural, or recreational activities dependent on such waters. The term AIS is synonymous with "aquatic nuisance

⁴ U.S. Fish and Wildlife Service, <http://www.fws.gov/mountain-prairie/species/plants/uteladiestress>

species". The AIS which now inhabit Utah or threaten the state with imminent arrival, include pathogens, fungi, algae, plants, mollusks, fish, amphibians and reptiles.

Aquatic invasive species are bad for Utah's environment and economy because they can threaten the diversity or abundance of native species by out-competing them for food, displacing them from natural habitats or infecting them with disease. AIS can also obstruct flow in waterways, impacting municipal, industrial, and irrigation water supply delivery. They degrade ecosystems and reduce or threaten recreational or commercial fishing opportunities. AIS can cause wildlife and public health problems. These reasons are not all-inclusive, but they do give cause for serious concern and need for aggressive management.

At Utah Lake, the biggest AIS threat is the introduction of quagga or zebra mussels (*Dreissena bugensis* and *Dreissena polymorpha*) from contaminated boats or trailers which had been recently used at waters infested with the mussels. Boat inspections, self-certifications, public education programs and standardized decontaminating procedures (washing trailer and boat thoroughly with 140 degree water) are some of protocols and activities implemented at Utah Lake State Park and other public and private marinas at the lake to address the AIS problem.

Other AIS such as *Phragmites*, tamarisk, and purple loosestrife were discussed earlier in the Vegetation section of this chapter.

K. Water Quality

The purpose of this section is to summarize the important water quality information that has been developed by previous studies of Utah Lake's water quality.

Utah Lake's beneficial uses as designated by the State of Utah include secondary contact recreation (activities like boating, water skiing, wading, or similar uses) which is beneficial use designation 2B; warm water game fish and associated food chain (designation 3B); waterfowl, shore birds and other water-oriented wildlife and associated food chains (designation 3D); and agricultural water supply (designation 4) (Utah Administrative Code R317-2-13-12).

Utah Lake water is often characterized as looking muddy or cloudy. This condition is largely due to a combination of suspended sediments, precipitated calcium carbonate particles and algae, and does not reliably indicate the presence of "manmade pollution" in the system because these three contributors to muddy appearance are primarily derived from natural sources. The Utah Division of Water Quality routinely samples the water quality of the lake and compares those results to State Water Quality Standards set to protect these uses. With two exceptions, total phosphorus (TP) and total dissolved solids (TDS), the lake's water quality meets water quality standards for its designated beneficial uses.

Phosphorous

The warm water fishery beneficial use of the lake is identified by the State of Utah as being impaired due to excess TP. Phosphorus is a nutrient that contributes to plant growth in aquatic systems in much the same way as it promotes the growth of agricultural crops and gardens. At low concentrations, it is critical to sustaining a healthy ecosystem but at elevated concentrations it can have detrimental effects. General concerns associated with elevated TP concentrations include excess plant growth (largely algae) and a shift to problem species of algae (cyanobacteria or blue-green algae) resulting in low dissolved oxygen, elevated pH, and the potential for cyanotoxin production by cyanobacteria. Utah Lake is a highly productive (eutrophic) ecosystem and regularly experiences large blue-green algal blooms, generally during the late summer and fall. These blooms can occur lake-wide. Sources of phosphorus discharge to Utah Lake are described on page 42.

Total Dissolved Solids

Utah Lake's agricultural beneficial use is listed as being impaired due to high concentrations of TDS. TDS is a measurement of the amount of mineral salts in water. Elevated TDS concentrations are a potential problem for irrigation and stock watering. Some crops do not produce well when irrigated with high TDS water, making irrigation management more difficult. High TDS concentrations in stock water can result in reduced milk production in dairy cattle, and illness in beef cattle.

L. TMDL Study

The most recent and comprehensive study of water quality of Utah Lake is the on-going study *Utah Lake Total Maximum Daily Loads (TMDL): Pollutant Loading Assessment & Designated Beneficial Use Impairment Assessment, FINAL DRAFT*, prepared for the State of Utah Division of Water Quality, dated August 2007. While the report focuses mainly on phosphorous and TDS, it draws on previous water quality studies and includes an extensive bibliography. The following information in this section on TMDL Study is all derived from that study unless otherwise cited.

The TMDL study includes:

1. A water budget summary from LKSIM, a Utah Lake Water Quality Salinity Model developed by researchers from BYU and led by LaVere Merritt.
2. A TP loading analysis as an indicator of water quality.
3. A TDS loading analysis for impairment of agricultural irrigation uses.
4. An impairment analysis for four beneficial uses:
 - a. Secondary contact recreation
 - b. Warm water species of game fish
 - c. Other aquatic wildlife
 - d. Agricultural uses

Following are key results of the TMDL study:

Water Budget Summary

Figures 4.1 and 4.2 show the sources of inflow and outflow of Utah Lake

Figure 4.1 – Inflow Water Budget For Utah Lake During The Period 1980–2003

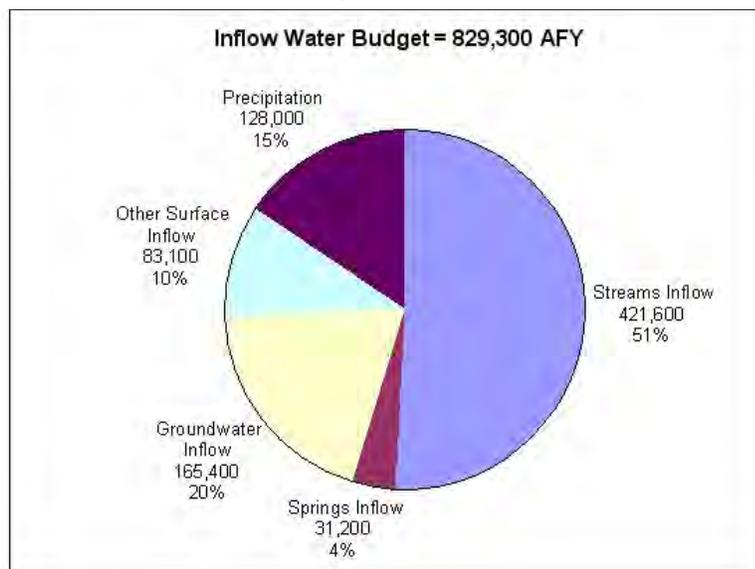
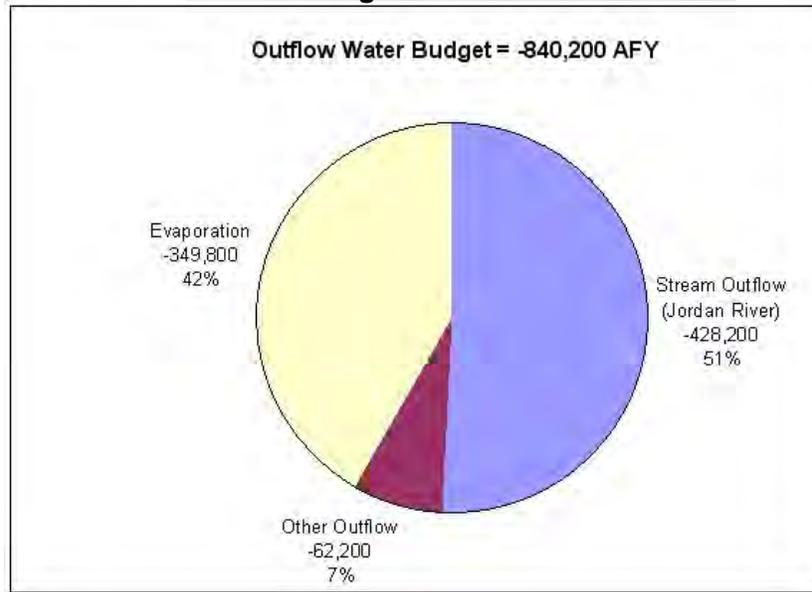


Figure 4.2 – Outflow Water Budget For Utah Lake During The Period 1980–2003

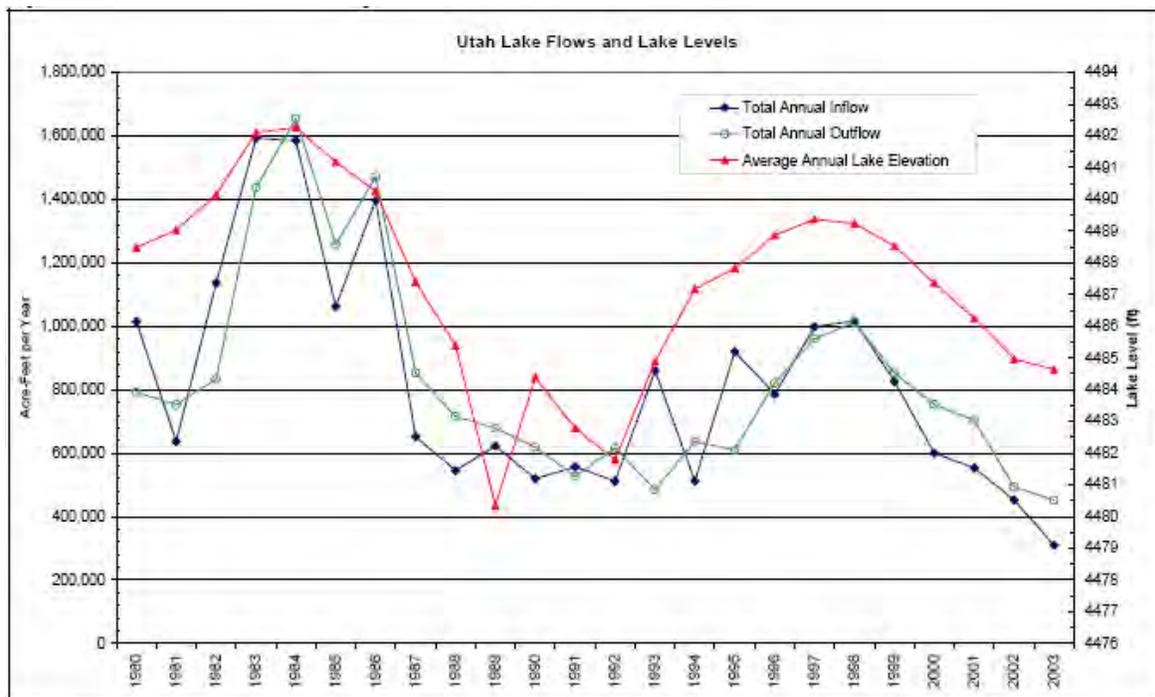


As shown on Figure 4.2, evaporation represents 42 percent of the outflow from Utah Lake. This is a result of the large surface area of the lake. This averages about 4 feet annually and nearly doubles the total dissolve solids compared to inflow waters (Merritt, 2008).

Another factor in the water quality of Utah Lake is the level of the lake. When the lake is low, the water quality is also poorer, particularly as represented by high TDS. Figure 4.3 shows the total annual inflow, outflow and average annual lake elevation.

Figure 4.3 – Total Annual Inflow, Outflow & Average Annual Elevation of Utah Lake

Source: TMDL, August 2007 Final Draft



TMDL Loading Analysis

Phosphorous. Discharges from wastewater treatment plants contribute the largest portion (76%) of the TP inflow loading to the lake with only 8 percent of the total inflow. Streams without wastewater treatment plants contribute 21% of the TP load, with the remaining 3% coming from miscellaneous surface drains, ground water sources, and springs. It is important to note that numbers represent inflow loading only and do not include internal loading. About 300 tons of phosphorous flow into the lake every year. Roughly 2/3 of this load is retained in the lake. Internal loading rates have not been determined, but are likely to provide a large source of available phosphorous.

TDS. Utah Lake's high evaporation rate is the most significant cause of elevated TDS levels. However, of the major inflows to the lake, the Provo and Spanish Fork Rivers contribute the largest percentage (43%) of the total TDS load. Wastewater treatment plants add 5% of the TDS load, while saline springs contribute an estimated 26%.

Beneficial Use Impairment Analysis

Agricultural Use – TDS: Lands irrigated by Utah Lake water experience about a one percent reduction in yield due to TDS. At the 1,200 mg/l criteria (TDS for beneficial use for agriculture), approximately a 3.5 percent reduction in yield would be expected. On average, most crops are not affected by current TDS concentrations. However, crops such as onions, orchards, and corn may be adversely affected because of lower salinity tolerances. These sensitive crops constitute only about 12 percent of the total acreage irrigated by Utah Lake water.

Warm Water Fishery Beneficial Use – Phosphorous: As discussed earlier, elevated phosphorous levels do not cause problems in lakes directly, but rather through secondary impacts such as shifts to undesirable blue-green algal species and large "blooms" resulting in low dissolved oxygen levels. Information from the following areas was reviewed to evaluate the relationship between nutrient levels and other factors to any observed impairment to the warm-water fishery.

Water Quality: In-lake sites were fully supporting of the warm water fisheries beneficial use based on temperature and dissolved oxygen criteria. Some parts of the lake experience short term exceedances, but not at a frequency or magnitude that would indicate impairment.

Fish Populations: Current population trends of dominant fish species (carp, black bullhead, white bass and channel catfish) have remained relatively stable and appear to be supported by habitat and water quality conditions. Native species such as the June sucker and Utah sucker are not expanding outside of stocking and protective programs. No apparent correlation is found between water quality and fish population trends in Utah Lake.

Algal Assessment: Phytoplankton data indicates a highly productive ecosystem with the majority of algal production occurring as large open-water cyanobacteria blooms in the late summer and fall. Algal communities show a relatively high overall algal species diversity, but blooms are low in diversity. Blooms are often dominated by extremely large numbers of as few as three to five species of known problem algae.

In summary, the draft Beneficial Use Impairment Report and data shows no evidence of significant dissolved oxygen or temperature impairment. Apparently, natural good mixing of the water column resulting from Utah Lake's shallow depth and near continuous wave action maintains sufficient dissolved oxygen in the water and prevents excessively high water temperatures. However, the Division of Water Quality has indicated that the lake exhibits a number of characteristics of a threatened system including:

- Nutrient enrichment

- Blue-green algal dominance
- Absence of native fish species - only the endangered June sucker, and Utah sucker remain
- Common carp dominate fishery
- Lack of rooted aquatic vegetation
- Prospect of continued and increased nutrient loads associated with future growth

These are indicators of an unhealthy ecosystem and will be monitored by the State.

Water Quality of Inflows to Utah Lake

Water quality can be assessed for any number of constituents. However, since phosphorus, and total dissolved solids are the principal water quality parameters evaluated by the Utah Lake TMDL, this description of water quality of inflow water is limited to these constituents. Table 4.2 shows average annual inflow and constituent loading to Utah Lake of TDS and phosphorus.

Table 4.2 – Summary of Inflow Loading of TDS and Phosphorus

| Tributary | Average Annual Inflow (acre-feet) | Percentage of Total Inflow | Average TDS Loading (tons/year) | Percent Contributing TDS Loading | Total Phosphorous Load (tons/year) | Percent Contributing Phosphorous Loading |
|-----------------------------|-----------------------------------|----------------------------|---------------------------------|----------------------------------|------------------------------------|--|
| Provo River | 150,200 | 33.2% | 61,200 | 10.9% | 7.9 | 2.7% |
| Spanish Fork River | 99,700 | 22.0% | 60,500 | 10.8% | 21.9 | 7.4% |
| Benjamin Slough | 34,300 | 7.6% | 36,500 | 6.5% | 16.6 | 5.6% |
| Mill Race (natural) | 9,400 | 2.1% | 5,100 | 0.9% | 1.4 | 0.5% |
| Hobble Creek | 19,800 | 4.4% | 7,700 | 1.4% | 1.4 | 0.5% |
| Powell Slough (natural) | 15,500 | 3.4% | 9,300 | 1.7% | 3.1 | 1.0% |
| Mill Pond | 12,100 | 2.7% | 7,000 | 1.2% | 1.2 | 0.4% |
| Dry Creek (Lehi) | 900 | 0.2% | 200 | 0.0% | 0.2 | 0.1% |
| Groundwater/Springs | 31,200 | 6.9% | 224,000 | 39.9% | 3.5 | 1.2% |
| Other Surface Water | 43,300 | 9.6% | 120,200 | 21.4% | 12.6 | 4.2% |
| Wastewater Treatment Plants | 36,400 | 8.0% | 29,800 | 5.3% | 227.8 | 76.5% |
| TOTAL | 452,800 | 100.0% | 561,500 | 100.0% | 297.6 | 100.0% |

Note: All data is from TMDL Study for period 1980-2003.

This ends the section describing and citing the TMDL Study.

M. Human Contact

Much of the public perceives Utah Lake as a polluted water body, unfit for human contact. This perception is derived mainly from the high turbidity of the water, its frequent algae blooms in mid to late summer and memories of the common discharges of raw sewage to Utah Lake which has not occurred since the 1960's. Through personal communications with David Wham, State Division of Water Quality and manager of the Utah Lake TMDL study, it was learned that data on bacteria and viruses (human pathogens) is not available in statistically significant amounts to demonstrate the absence or presence of pathogens that would be harmful to humans.

Health departments generally do not encourage swimming and bathing in any open waters because of their concern over possible contamination of the waters by the users and swimmers themselves—and subsequent infection of others. “Secondary contact” by fishermen, boaters, water skiers, etc. is common and “protected” by the water quality classification (Beneficial Use Designation 2b) of Utah Lake.



N. Heavy Metals and PCBs

The USHD was contacted for information concerning PCBs, and heavy metal toxicity of the lake. According to the health department, UDNR conducted fish sampling in the late summer of 2007 and determined that carp and channel catfish had concentrations of PCBs in exceedance of EPA standards (Utah Department of Health Office of Epidemiology, 2005). USHD, UDNR, and UDEQ are sampling lake sediments in 2008 in order to characterize distribution of PCBs. The purpose of sampling the sediment as opposed to the water column is an attempt to identify sources, and since PCBs are not water soluble, they cannot be found in the water column.

O. Issues and Trends

A current significant current natural resource issue is the reduction of the carp population. The potential benefits to Utah Lake are significant. Until carp are controlled their removal will remain a high priority issue because the carp impact so many of the other natural resources of Utah Lake.

As population increases around Utah Lake, the potential for more pollutants being added to the lake through runoff and human activities will increase. Wastewater effluent is currently not specifically treated for phosphorus removal. Population increases will likely result in increased nutrient loading to Utah Lake through wastewater treatment plants. Offsetting those increases, at least partially, will be decreased runoff from irrigated farmland that conveys nutrients.

As wetlands are impacted by development projects, it will become increasingly important for wetland mitigation to occur.

There is an increased recognition of the importance to control stormwater pollutants, mostly suspended solids and oils from passing downstream. State agencies and municipal governments are more frequently requiring best management practices in stormwater pollution prevention. As urbanization increases adjacent to Utah Lake, there is the potential for increased surface water runoff requiring more control of stormwater pollution.

Management of Utah Lake water resources is changing as water rights are being changed from agricultural uses to municipal uses. The trends have been to move Utah Lake rights to wells, resulting in fewer releases downstream from Utah Lake and potentially less groundwater inflow to the lake. This is occurring in both Salt Lake and Utah counties using water rights from Utah Lake.

The invasion of phragmites is continuing virtually unabated. The perception is that current control efforts are not sufficient to reverse the increases in phragmites. This trend could

significantly harm the ecosystem of the wetlands adjacent to the lake, creating a mono-culture replacing the remaining diversity currently present.

Because of its natural characteristics, Provo Bay a great resource for the recovery of June sucker and also serves as ideal habitat for waterfowl.

Finally, serious threat of invasion by aquatic species in Utah Lake exists, in particular zebra (*Dreissena polymorpha*) and quagga (*Dreissena bugensis*) mussels. The zebra mussel is native of Eurasia and the quagga mussel is native of Ukraine. Quagga mussels have not been found in Utah but have recently spread to the lower Colorado River. Zebra mussels have not been sighted in Utah or the lower Colorado River but have been sighted as close as California and Kansas⁵. Both mussels colonize hard surfaces and are prodigious water filters. They could dramatically change the ecosystem of Utah Lake, impact recreation and clog intakes to pumps and boat motors. Management and control of these species will likely increase in the future.

⁵ <http://nas.er.usgs.gov/taxgroup/mollusks/zebramussel/default.asp>

V. RECREATION

A. Historical Setting

Recreation on and around Utah Lake has a long history, extending back to at least the late 1800's, and has included boating, swimming, fishing, picnics, horse-racing, bonfires, and more recently boat racing, and water skiing. Resorts included Geneva Resort, Garden City Resort, Provo Lake Resort, and Provana Beach Resort (Horns, ed. 2005). There have been as many as 20 resorts on the lake at one time. Fishing and duck hunting have also been long-term, broadly enjoyed pastimes on Utah Lake.

The level of recreational use of the lake and its shorelines has depended, in large part, on public perceptions of the attractiveness and cleanliness of the lake. According to the Utah Lake Comprehensive Management Plan Resource Document (Horns, ed. 2005), the use of Utah Lake as a recreational destination has declined over time from the effects of water level changes, adverse perceptions of lake water quality, industrial uses (Geneva Steel Mill), and changes in sport fish populations. Recreation use in the past few years has been reduced primarily by drought, particularly in the fall when lake water levels become too low to operate many boat harbors on the lake. However, low water levels allow for other types of recreational uses as the low water level exposes many sandy beach areas. As the lake level changes, there may be opportunities to promote different types of recreation.

B. Recreation on Utah Lake

There are a number of developed recreation and leisure activity facilities on and near Utah Lake, including developed parks, trails, boat harbors and launching sites. There are also a number of Forestry, Fire & State Lands (FFSL) permitted, but relatively undeveloped, lake access points for fishing, hunting, non-motorized boating and other passive recreational activities. Finally, there are also a number of traditional, but not officially designated, recreation areas on the lake.

The Public Trust Doctrine, under which the FFSL manages Utah Lake, holds that public trust resources should be accessible to all the residents of the State, and emphasizes that navigation, fishing and commerce should be made available to all.

Recreation on Utah Lake depends on useable access to the lake and, for some purposes, on the availability of developed recreational facilities. As recreational activities have become more focused on motor-boating, the importance of developed recreational facilities has increased. Recreational activities have also become contributors to the economies of communities near recreational attractions. Utah Lake offers both developed and undeveloped recreation access and facilities, which are discussed separately here.

C. Developed Recreation Facilities

Developed recreation facilities in the study area are constructed and operated by public and private entities. Tables 5.1, 5.2 and 5.3 list and describe the facilities located at marinas, parks, and golf courses in the study area. Some facilities are focused on the lake and its shorelines, others are not lake-focused, but offer recreational activities within the study area. One of the most significant lake-oriented public recreation facilities is Utah Lake State Park. Another is the planned and partially constructed lake shore trail system which will connect many of the cities around Utah Lake. Those cities also maintain parks, golf courses, sports complexes and marinas in the study area.

Utah Lake State Park - The largest lake-oriented recreation feature on Utah Lake is Utah Lake State Park, operated by the Utah Division of Parks and Recreation under a General Permit issued by FFSL. Utah Lake State Park is located on the eastern shore of Utah Lake on the site of the former Provo Boat Harbor. Established in 1967, the Park offers a marina, boat ramps, restrooms with showers, and a 53-unit campground for tents and RVs. Visitation at the Park has averaged about 300,000 visitor days per year for the last 12 to 14 years, with a decline to about 150,000 visitor days per year starting in 2000 due primarily to low water levels late in the summer. The Utah Lake State Park Resource Management Plan (Division of Parks and Recreation, 2001) was adopted to guide future development in the Park. The core of the Plan is a series of Issues and Recommendations that identify priorities for facilities development; natural resource management; education and information; funding, staffing and operations; land management; and collaborative partnerships. The details of those implementation steps are described in the 2001 Plan document. Park managers have indicated that implementation of the 2001 Plan has progressed, but that it may be time to revisit and update the Plan.

Other Harbors and Marinas – In addition to Utah Lake State Park, FFSL has issued seven authorizations for use of sovereign lands for the construction and operation of marinas and boat ramps on Utah Lake. The other permitted developed boating facilities on the lake include:

Privately-operated marinas

1. El Nautica Boat Club
2. Saratoga Harbor (Saratoga Homeowners Association Marina)
3. Timp Marina Club
4. Lindon Harbor (open to the public)

Public marinas

1. Pelican Bay Harbor (Saratoga Springs City Marina)
2. American Fork Boat Harbor (City of American Fork)
3. Lincoln Beach Boat Harbor (Utah County)

All the permitted marina facilities on Utah Lake are open to the public, except for El Nautica Boat Club, Timp Marina Club, and the Saratoga Harbor, and offer boat-launching ramps, restrooms and other related facilities. These harbors and marinas are shown on Map 5.1.

Golf Courses – Although not directly related to Utah Lake, there are three public golf courses within the study area as depicted on Map 5.1 and listed in Table 5.3. The Reserve at East Bay Golf Course is a full-size 18-hole course located east of Provo Bay. The East Bay facility includes a clubhouse, driving range, and restaurant. The Sleepy Ridge Golf Course is located adjacent to Utah Lake in Orem, and is a relatively new, 18-hole championship course. The Talons Cove Golf Club in Saratoga Springs is also a championship 18-hole course with full amenities.

Municipal Parks – A number of cities around Utah Lake operate and maintain municipal parks within the study area. Some parks are adjacent to the Utah Lake shoreline and are lake-oriented. Others are not lake-oriented, but are within the study area. Parks that offer a variety of amenities that add to the recreational facilities and opportunities in the study area include Eagle Park in Saratoga Springs; Mountain Meadows Park in American Fork; Northlake Park and Spring Creek Ranch in Lehi; Lakeside Sports Park and Springwater Park in Orem; and Sunset View Park, West Park, Fort Utah Park, and Footprinter's Park in Provo. These parks are listed in Table 5.2. Lindon City owns Geneva Resort Park, which is unimproved, located near the Lindon Boat Harbor.

TABLE 5.1 – Marinas

| Marina | Location | Marina Availability | Tent Camping | Camping Fees | RV Sites | Utilities Hookup | Group camping | Group Day Use | Showers | Modern Restrooms | Picnicking | Drinking Water | Visitor Center Clubhouse | Fishing Access | Fish Cleaning Station | Dump Station | Boat Ramp | Boat Dock | Beach/Swimming | Walking/Biking Trails | Watchable Wildlife | Winter Activities | Concession |
|--|--------------------------------------|---------------------|--------------|--------------|----------|------------------|---------------|---------------|---------|------------------|------------|----------------|--------------------------|----------------|-----------------------|--------------|-----------|-----------|----------------|-----------------------|--------------------|-------------------|------------|
| Pelican Bay Harbor (Saratoga Springs City Marina) | 150 E. Harbor Pkwy. Saratoga Springs | Public | N | N | N | N | N | Y | Y | Y | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | Y | Y | N |
| El Nautica Boat Club | 4025 N. Redwood Rd. Saratoga Springs | Private | N | N | Y | N | N | Y | Y | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | N | Y | Y | N |
| Saratoga Harbor (Saratoga Homeowners Association Marina) | 625 S. Saratoga Dr. Saratoga Springs | Private | N | N | N | N | N | N | Y | Y | Y | Y | Y | Y | N | N | Y | Y | N | Y | Y | Y | N |
| American Fork Boat Harbor | 100 W. 2000 S. American Fork | Public | N | N | N | Y | N | Y | N | Y | Y | N | N | Y | N | N | Y | Y | N | N | Y | Y | N |
| Timp Marina Club | 100 W. 1951 S. American Fork | Private | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | N | Y | Y | Y | N | N | N | N | N |
| Lindon Harbor | 2130 W. 600 S. Lindon | Public | Y | Y | N | N | N | Y | N | Y | Y | N | N | Y | Y | N | Y | Y | N | Y | Y | Y | N |
| Utah Lake State Park | 4400 West Center St. Provo | Public | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Lincoln Beach Boat Harbor* | 4700 South Lincoln Beach Rd. | Public | Y | Y | N | Y | N | Y | N | Y | Y | Y | N | Y | Y | N | Y | Y | Y | N | Y | N | N |

*Free access

TABLE 5.2 – Parks

| Park | Location | Pavilions | Group Day Use | Picnicking | Modern Restrooms | Walking/Biking Trails | Playground | Tennis Courts | Basketball Courts | Skate Park | Sports Fields | Special Features |
|-----------------------|--|--------------|---------------|------------|------------------|-----------------------|------------|---------------|-------------------|------------|---------------|--------------------------|
| Eagle Park | 1520 S. Centennial Blvd. Saratoga Springs | N | N | Y | Y | Y | Y | N | N | N | N | Access to lake |
| Inlet Park | 314 S. Saratoga Rd. Saratoga Springs | Y | \$50/day | Y | Y | Y | Y | N | N | N | N | Access to lake |
| Northlake Park | 2100 S. 500 W. Lehi | Y | Y | Y | Y | Y | N | N | N | N | N | — |
| Spring Creek Ranch | 1700 S. 650 E. Lehi | Y | Y | Y | Y | Y | Y | Y | Y | N | N | Private and Public |
| Mountain Meadows Park | 400 S. 500 W. American Fork | N | N | Y | N | Y | Y | N | N | N | N | — |
| Lakeside Sports Park | 400 S. 1859 W. Orem | \$50 | Y | Y | N | Y | Y | N | N | N | Y | Soccer & Softball fields |
| Springwater Park | 945 S. Artesian Rd. Orem | \$50 | Y | Y | Y | Y | Y | Y | Y | N | Y | Lights, BBQs |
| Sunset View Park | 525 S. 1600 W. Provo | N | Y | Y | Y | N | Y | N | N | N | Y | Soccer |
| West Park | 100 N. 1700 W. Provo | N | N | Y | N | N | N | N | Y | N | N | — |
| Fort Utah Park | 200 N. Geneva Rd. Provo | \$30 \$20 | Y | Y | Y | N | Y | N | N | Y | Y | Sand Volleyball |
| Footprinter's Park | 1150 S. 1350 N. Provo | \$20 | Y | Y | Y | N | N | N | N | N | N | Fish Pond |

TABLE 5.3 – Golf Courses

| Golf Course | Location | # of Holes | Distance of Course | Par of Course | Modern restrooms | Showers | Visitor Center Clubhouse | Restaurant/ Snack Bar |
|---------------------|---|------------|--------------------|---------------|------------------|---------|--------------------------|-----------------------|
| Talons Cove | 2220 S. Talons Cove Dr. Saratoga Springs | 18 | 7037 yds. | 72 | Y | Y | Y | Y |
| Sleepy Ridge | 700 S. Sleepy Ridge Dr. Orem | 18 | 7017 yds. | 72 | Y | Y | Y | Y |
| Reserve at East Bay | 1860 S. 380 E. Provo | 18 | 6900 yds. | 72 | Y | Y | Y | Y |

Trails

Another significant recreational feature in the Utah Lake study area is the shoreline trail system which is shown on the Recreation Map 5.1. Utah County has taken the lead in developing the Utah Lake Trail, a trail along the east and north shores of Utah Lake. Portions of the Utah Lake Trail have been completed between the Provo River and the Lindon Boat Harbor and east of the Jordan River and some areas are currently under construction. Once completed, the trail will connect the Provo River and Jordan River trails.

The City of Saratoga Springs has a completed trail along the shore from the Jordan River to the El Nautica Marina. The cities that abut Utah Lake have identified corridors for an interconnected system of shoreline trails that extends from Springville on the south to and through Saratoga Springs on the north. Not all segments of the identified trail corridor have been constructed, but each participating municipality has identified the lakeshore trail and interconnected lateral trails in the parks and trails elements of its general plan. The shoreline trail system, when fully constructed, will provide non-motorized transportation, trail recreation, and access to Utah Lake throughout the developed eastern and northern portions of the Utah Lake study area.

Fishing and Hunting

Based on the archaeology of Utah Valley, fishing and hunting on and around Utah Lake has been active for thousands of years (Janetski, 1990). Utah Lake remains an important destination for both hunting and fishing.

Sport fishing in Utah Lake includes catfish, black bullhead, walleye, white bass, black crappie, smallmouth bass, yellow perch, bluegill, and carp. According to a creel survey conducted by the Utah Division of Wildlife Resources and the June Sucker Recovery Program (Watson and Mills, 2007), fishing for catfish and black bullhead account for most of the daylight fishing hours spent on the lake. That creel survey, conducted in 2005-2006 determined that the fishing effort on Utah Lake for the one-year survey period was 59,237 angle hours. For comparison, a one-year creel survey of Deer Creek reservoir for the same period showed approximately 105,000 angler hours.

The UDWR creel survey also indicated that 84% of anglers fished from the shoreline of the lake, with 10% fishing by boat and the remaining 6% ice fishing or fishing from float tubes. These figures underscore the importance of fishing access to Utah Lake.

Similar hunter surveys for Utah Lake are not available, but it is evident that most bird hunting takes place either on the lake shoreline or in the shallow water just off-shore, making shoreline access an equally important factor for hunters. Popular waterfowl hunting areas include Powell Slough, Provo Bay, Benjamin Slough, and Goshen Bay.

D. Undeveloped Recreation Areas

Long before the advent of large power boats and water skiing, Utah County residents and visitors regularly launched small fishing and pleasure boats from a variety of beaches and other locations around Utah Lake. Likewise, large areas of lakeshore were open for picnicking, fishing, camping, and casual uses. As residential and other development approached and surrounded the lakeshore, some traditional small-boat launches, like Pelican Point in Saratoga Springs, become less accessible. At the same time, a growing population around the lake began to crowd traditional gathering places like Sandy Beach.

Undeveloped recreation access areas are frequently abused, and issues relating to nuisance, littering, noise disturbance and crime have arisen over time. The nature of casual use and lack of management oversight of these areas has made many of them unusable for the full range of their intended recreational activities. Law enforcement is divided among jurisdictions, making uniform and regular patrolling and enforcement difficult. User fees associated with authorized access has resulted in unauthorized, non-fee access for fishing and other short-period uses.

Interest and participation in non-motorized recreational activities is increasing. Sports such as kayaking, rowing, small-boat sailing, and windsurfing require shoreline access for the purposes of unloading, rigging, and launching watercraft that can be carried from a car or truck to the water's edge.

E. Issues and Trends

The recent low water levels of Utah Lake have significantly shortened the boating season and reduced the recreational use of the lake by power boaters and sail boaters. The lack of maintenance and management of the undeveloped recreation access areas has likewise reduced the utility and attractiveness of casual recreational use of the lake. Discussions with stakeholders suggest that factors such as vandalism have reduced private property owners' willingness to allow public access to shoreline areas, reducing the number of access points for casual recreation, fishing, and small-boat launching on the lake.

Although some operators of the harbors and marinas on the lake have informally collaborated to assist recreational users in finding access and facilities that meet their needs, there is no formal coordinated recreational use planning or operation among recreation providers on Utah Lake. Although Utah Lake State Park collects visitor and use information, no comprehensive use data, or needs assessment information has been collected for the lake as a whole.

Anecdotal evidence suggests that recreational use of Utah Lake is lagging behind its potential, and that many more and diverse opportunities for recreational activities on the lake exist. Likewise, the lake's potential as a recreational and tourism economic engine for the county has not been fully explored.

Utah Lake boating enthusiasts also boat in other waters, both in and outside of Utah. The possibility of boats and trailers contaminated with quagga or zebra mussels coming to Utah Lake rises as these aquatic invasive species (AIS) are spread around. Boaters will be subject to stricter protocols to ensure that these AIS are not introduced to Utah Lake.

VI. PUBLIC SERVICES AND CAPITAL FACILITIES

Map 6.1 shows the public utilities located within the study area and adjacent to the study area. This map demonstrates that there are very limited public services associated with Utah Lake. It shows that there are large power transmission lines on both the east and west side of the lake. A large natural gas line on the east side passes through the mouth of Provo Bay.

The existing marinas have public restrooms. Also, the communities near the lake all have wastewater collection facilities.

The only known proposed public facility is a large diameter (60-inch) water transmission line that CUWCD is planning to construct between the former Geneva Steel site and Saratoga Springs. Its tentative location is shown on the map as the North Shore Aqueduct preferred route.

There are essentially no public facilities in the southern half of Utah Lake with the exception of limited facilities at the Lincoln Beach Boat Harbor.

The location of wastewater treatment facilities are also shown on the map. The only wastewater treatment facilities within or adjacent to the study area are Timpanogos Special Service District (TSSD) (south of American Fork) and the Orem Wastewater Treatment Plant, near Utah Lake and south of Vineyard. Provo City's wastewater treatment facility discharges treated effluent to Provo Bay.

Timpanogos Special Service District has a large collector line on the north side of Utah Lake within the study area. They also have another sewer corridor north of this line. Both the TSSD sewer line and corridor are shown on Map 6.1.

Septic systems within the study area or adjacent to the study area are limited to those few homes not included in subdivisions. They are not considered a significant source of potential pollution of Utah Lake.

The only known communication towers located within the study area are in the Provo Bay vicinity. There are no known oil pipelines within the study area and one 20-inch diameter Questar gas pipeline that crosses Provo Bay and is adjacent to the east shore through Provo City. There is one large electrical power line on the east side of the study area and a natural gas power plant east of the Lindon Boat Harbor. Map 6.1 shows the location of these facilities and demonstrates the limited presence of gas and oil pipelines near Utah Lake.

A. Groundwater Development

Potable water availability is an important factor in any development around Utah Lake. This section summarizes and generalizes the availability of potable-grade water around Utah Lake.

Groundwater development for potable water use has occurred on the east side of Utah Lake, north of Provo Bay, and extends around the lake to the Jordan River. The groundwater is high quality and has artesian pressures to the ground surface. This source of water is not influenced by Utah Lake water. Groundwater enters Utah Lake but there is no evidence that Utah Lake water is entering the groundwater.

On the west side of Utah Lake from the Jordan River to Mosida, the groundwater is generally unsuitable for potable water use. The limiting constituent is usually high TDS. Some sources have arsenic levels exceeding drinking water standards, which would require expensive treatment before use.

Between Mosida and Elberta, the water quality generally improves and there are no known constituents in the water that would limit its use for a potable water source. Groundwater in the

Benjamin area (south of Provo Bay) is perceived to be generally of potable quality, similar to the area north of Provo Bay, but there are no known community water systems in this area.

B. Development Limitations

Development around Utah Lake is limited by the availability of water and sewer facilities. Generally, more facilities are available between Provo and Saratoga Springs than on the southern portion of the lake. West side development is limited by the unavailability of potable water and wastewater treatment facilities. Addition of on-lake or marina public sanitation facilities requires collection and pumping to adjacent, existing wastewater treatment facilities or development of new treatment plants.

C. Issues and Trends

The trend for public facilities generally follows the trends for land development as described in Section II. There are two exceptions. The proposal to construct a 60-inch diameter water line along the north shore of Utah Lake is primarily a conveyance pipeline to Eagle Mountain, Lehi and Saratoga and not directly related to development along its alignment. The other is a proposed regional wastewater treatment plant planned for the south shore of Provo Bay by the South Utah Valley Municipal Water Association (SUVMWA).

SUVMWA is an association comprised of ten communities between Springville and Goshen. Seven of the ten communities are participants in planning for the proposed region wastewater facility. A 240-acre property has been acquired (See Map 6.1) and construction of the plant is expected in 15 years. The purpose of the proposed regional wastewater treatment plant will be to increase capacity and provide a broader service area.

Future development of other public facilities within the study area will likely to be associated with specific proposals for development. Those proposed projects far from existing infrastructure will have the added development challenges associated with locating and developing potable water, wastewater treatment and disposal, power and natural gas delivery.

VII. RESOURCE MANAGEMENT PLANS AND GUIDELINES

State of Utah Agencies

DEPARTMENT OF NATURAL RESOURCES

Division of Forestry, Fire & State Lands

Utah Lake Comprehensive Management Plan Resource Document, 2005.

Division of Water Resources

Utah State Water Plan, Utah Lake Basin Plan, 1997.

Utah's M&I Water Conservation Plan, 2003

Municipal and Industrial Water Supply and Use in the Utah Lake Basin, 2008

Water Related Land Use Inventories, Utah Lake Basin, 2008

Division of Parks and Recreation

Utah Lake State Park Resource Management Plan, 2001.

Division of Water Rights

Interim Water Distribution Plan for the Utah Lake Drainage Basin, 1993 (originally 1989).

Division of Wildlife

Utah Lake Drainage Management Plan, Hydrologic Unit 16020201, 2003.

Provo River Drainage Management Plan, Hydrologic Unit 16020203, 2003.

Central Region Wetlands Conservation Strategy, 2001.

Utah Lake Wetland Preserve, 1994.

Recommendations for the Restoration, Protection, and Economic Development of the Water and Lands of the Utah Lake Environment, 1994.

Utah Sensitive Species List, 2007.

Wildlife Comprehensive Wildlife Conservation Strategy, September 9, 2005.

DEPARTMENT OF ENVIRONMENTAL QUALITY

Division of Water Quality

Utah Lake TMDL: Pollutant Loading Assessment & Designated Beneficial Use Impairment Assessment, 2007.

OTHER PLANS OR AGREEMENTS

June Sucker Recovery Plan

1985 Compromise Agreement

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**APPENDIX A
MAPS
STATEMENT OF CURRENT CONDITIONS**